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The MILITARY REVIEW disseminates modern military thought and current Army doctrine concerning command and staff procedures of the division and higher echelons and provides a forum for articles which stimulate military thinking. Authors, civilian and military alike, are encouraged to submit articles which will assist in the fulfillment of this mission.

POLICY.

Unless otherwise indicated, the views expressed in the original articles in this magazine are those of the individual authors and not necessarily precisely those of the Department of the Army or the U. S. Army Command and General Staff College.

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MILITARY REVIEW

VOLUME XXXVIII APRIL 1958 NUMBER 1

CONTENTS

The Barefoot Girl From Domremy ---- 3
Colonel V. J. Gregory, United States Air Force Reserve, Retired

Command Management and You ---- 8
Lieutenant Colonel James C. Wilkins, Infantry

Two Airborne Raids in North Vietnam ---- 14
Lieutenant Colonel Albert Merglen, French Army

Atomic Air Defense ---- 21
Lieutenant Colonel Jack C. Evans, Jr., Artillery

Artillery of the Pentomic Infantry Division ---- 32
Major Robert M. Young, Artillery

North American Air Defense Command ---- 43

Keeping Pace With the Future—A Perspective of Larger Units ---- 51
Colonel Hughes L. Ash, Infantry

MILITARY NOTES AROUND THE WORLD ---- 65

FOREGIN MILITARY DIGESTS ---- 75
Night Attacks ---- 75
Future War—That Great Unknown ---- 83
How Clear Is My Crystal? ---- 89
What's Our Line? ---- 97
Army Organization in the Atomic Age ---- 104

BOOKS OF INTEREST TO THE MILITARY READER ---- 110

The Barefoot Girl From Domremy

Colonel V. J. Gregory, *United States Air Force Reserve, Retired*

THIS military heroine is just as significant today as in the days when kings ruled the earth. She remains a timeless source of inspiration to military students as well as to the literati of all nations.

Novelists in a dozen lands have dipped their quills in a fountain of tears, enveloping her in a miasmal cloud of the supernatural. In drama she is depicted as a saint in the first act; in the second she is condemned, and burned in the third. Historians, attempting to appraise her military status, largely have fallen into the error of fiction writers and dramatists.

Joan of Arc

Superstitious nonsense to the contrary, the facts are clear. Joan of Arc achieved her objectives. As the French *chef de guerre* she crushed the English invaders in a series of brilliant battles, leading to the termination of the 100-year-old war between France and England.

Her first and greatest victory undoubtedly was at Orleans where she forced the English to raise the siege. Wounded while leading an assault against Les Tourelles, a twin-towered fortress, she plucked out the arrow shaft, rallied and cried, "My banner touches the wall, the place is yours." She was at the head of her troops, mounted on a horse, not a broomstick.

Situation in France

The situation in France at that time was critical. France had two masters, one of whom was the infant son of the late King Henry V of England. His protector, Uncle John of Lancaster, Duke of Bedford, sat in Paris and governed northern France. The other master was the Dauphin who, although proclaimed King Charles VII, was denied the throne of his native land by the Treaty of Troyes. He was pliant, tractable, and permitted himself to be pushed around by his own courtiers.

Further, France was split by a factional fight. The Burgundians and Armagnacs carried on a bitter conflict. Roving bands of undisciplined soldiers and vandals pillaged and robbed. The people were dispirited, poverty stricken, and miserable. It was not a happy land.

Journey to Chinon

In the village of Domremy, province of Lorraine, lived Joan, daughter of peasant parents, Jacques and Isabelle d'Arc. She listened to travelers passing through the village who brought disturbing stories of an impending English invasion. They reported that the Duke of Bedford had besieged Orleans on 12 October 1428. This city which sprawled along the northern banks of the Loire was the gateway to southern France. It was feared that if the duke succeeded in overpowering the city, he would attack the southern provinces and gather the entire nation under a foreign flag. Joan brooded and dreamed, decided to help the Dauphin. She was 16.

She faced rugged opposition in attempting to reach the Dauphin who had his court in Chinon Castle. Joan confided in her father who scoffed at her dreams, rid-

The Maid of Orleans swept away the feudal pattern of life. Her victories were achieved not by witchcraft, as charged, but by sound military principles applied with foresight, initiative, and inspired leadership

iculed her aims, and ordered her to go about the routine chores at home and in the field. Dedicated to a devout cause, Joan detached herself from her family, and persuaded the military governor in nearby Vaucouleurs to escort her to Chinon.

Cool Reception

The reception was chilly. Joan, however, was not dismayed when the Dauphin failed to welcome her with open arms. He yawned as she talked to him and turned her over to his prelates, military advisors, and lace-sleeved dandies. Joan was humiliated, lodged in the tower of Coudray, but she took the beating like a soldier. What was needed, she concluded ruefully, was a bolt of lightning to make them sit up and take notice.

While the Dauphin and his advisors were twiddling their thumbs, the Duke of Bedford continued pounding the gates of Orleans. Joan resumed her pleas. The French generals, garbed in colorful uniforms, their chests full of glittering medals, merely smiled. They said in effect, "See here, Joan, if we captains, who are capable tacticians and experienced in the art of warfare, cannot upset the English, how can you hope to cope with them? You know absolutely nothing about maneuvers and yet you desire to lead our army. Your plan is preposterous. Go home to your sheep."

The Dauphin Impressed

Joan persisted. Finally, the Dauphin was impressed by Joan's conviction, sincerity, loyalty, and perseverance. He estimated that he had little to lose by giving her a chance. He already had been advised that Orleans would have to yield. The English appeared invincible. The French lines simply dissolved when confronted by tough English yeomen armed with red yew bows and steel-tipped shafts. The Dauphin issued the necessary orders.

Joan was buckled in shining armor, mounted on a horse, given a white banner, and placed at the head of 5,000 cavaliers. The column moved toward besieged Orleans. Joan revealed that she was an expert horsewoman, the equal of Jean de Dunois, the general charged with the defense of the besieged city. On the march she endured the privations and hardships of the soldiers. She drove off hordes of female camp followers, forbade cursing, and instilled the spirit of victory in her troops. Soldiers sang as they swung along the dusty road. In this maneuver there was no evidence of witchcraft.

Battle of Orleans

Joan had planned a direct approach to Orleans and depended upon Dunois to guide her. The French general, however, considering Joan's plan too hazardous, brought her army to a point opposite the city on the south side of the Loire. Displeased by the deception on the part of the French flower of chivalry, Joan upbraided him. As a consequence of this contrary piece of business, the relief supply boats were delayed in reaching the besieged city.

On 28 April 1429 Joan crossed the river and advanced between the strongest forts, an action which surprised and paralyzed the English. Direct action confounded the enemy.

Joan found Orleans blockaded by a series of 60 bastides or redoubts in addition to a number of large forts, all of which garrisoned 10,000 English troops commanded by the Earl of Suffolk. The previous commander, Duke of Salisbury, had

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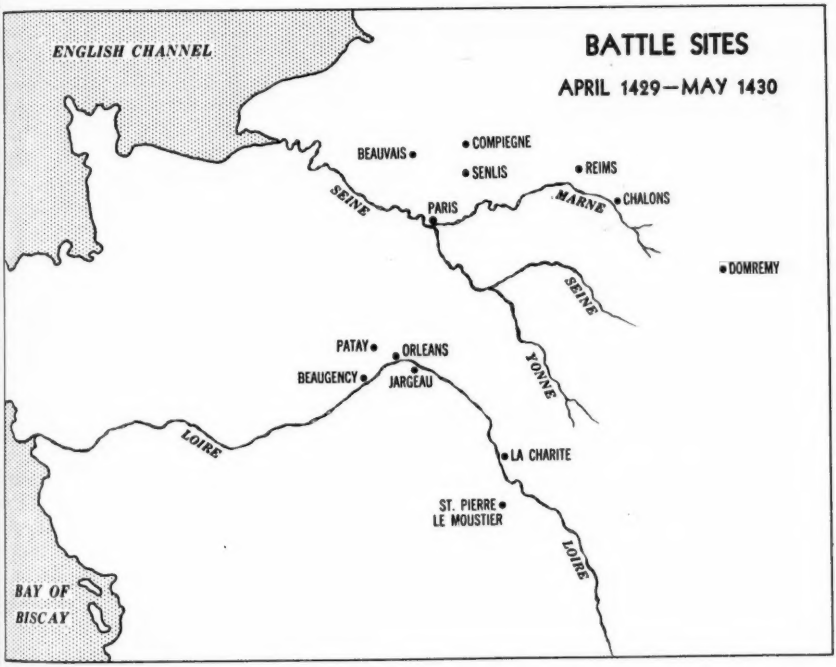
lost his life in the early days of the siege. The suburban area on the south side of the river, Joan noted, had been leveled to the ground by the defenders in order to deny military advantages to the enemy. A masonry bridge across the Loire linked the two sections of the city. Dominating the approach was Les Tourelles which the English had seized.

Inspired French troops now took the offensive and held it during the bitter struggle for possession of the forts. They captured them one by one in desperate hand-to-hand encounters. Her troops swarmed onward as Sir William Glandsdale, the English fort commander, tumbled into the river from the bridge leading to Les Tourelles and was drowned. Resist-



Joan also noted that veteran French defenders, who had resisted the English since the start of the siege, were fatigued, discouraged, and low in morale. During the preceding February they had been beaten soundly by Sir John Fastolf in the Battle of the Herrings at Rouvray. French lances and Scottish broadswords proved unequal to English archery. With the arrival of Joan's relief army the defenders polished their buttons and perked up their spirits.

ance stopped. The English might was broken. The siege was raised 9 May 1429.

Further Victories

Joan was embraced by the Dauphin; hopes soared and she was directed to continue pressure on the enemy. Although the French military chieftains refused to acknowledge her as an equal, Joan gave them odds in battle leadership, bravery, courage, and valor. It was she who outlined the strategy and prescribed tactics to achieve

victory. She displayed intuitive military genius.

Joan continued to drive the English from other strong points along the Loire and elsewhere. At Jargeau the Earl of Suffolk was taken prisoner; at Beaugency and Chalons the English gave way to the embattled French. In June 1429 Joan won a brilliant victory at Patay with a surprise attack. The English commander, Sir John Fastolf, complained that his formations were incomplete when swooped upon by the French cavaliers. His yeomen fled in panic. Boldness characterized Joan's tactics. She challenged the might of the English with artillery, blasting mass formations of archers with cannonball.

With the enemy on the run Joan insisted that Charles VII be crowned at Reims. He demurred on the ground that Reims lay in enemy territory. The timid king finally yielded as Joan cleared the path. Her army swept north, crossing the Yonne, Seine, and Marne Rivers en route to the coronation city. She stood beside the king during the crowning ceremony on 17 July 1429. There was no sorcery in this undertaking.

The crowning of Charles VII climaxed Joan's efforts to restore the nation to historic greatness. Her mission was fulfilled. She begged the king to relieve her from further service. She wished to return to her parents and to resume her simple mode of life. The king denied the request, insisting that she continue to lead his victorious army. As a soldier she obeyed.

Bishop Cauchon

During the month of August, following the king's coronation, Joan's army humbled the British at Senlis and Beauvais. Bishop Pierre Cauchon was expelled from Beauvais. If Joan could have foreseen the consequences of this act, the question arises whether she would have spared Cauchon such humiliation. For this devout Burgundian ally and English sympathizer was destined to condemn her.

Joan carried on in obedience to her king's command, although the boldness and cyclonic dash which had marked her previous maneuvers no longer were evident. The main struggle was over and she felt, perhaps, that mopping-up actions could be continued without her leadership.

Capture

However, the momentum carried her onward and during September 1429 she attacked the English in Paris. She was wounded severely. Within a month she was astride her horse again, taking the enemy at St. Pierre le Moustier. But at La Charite she was defeated. And finally, in May 1430 she was captured at Compiegne where she had entered into battle with a small force of 600 cavaliers. The Burgundians who captured her tossed her into a cell where she remained four months while her captors haggled over a price tag.

Joan was sold in the manner of a rag doll to the Duke of Bedford, protector, regent, commander in chief, a shining example of English nobility. John of Luxembourg of the Burgundians, who received 10,000 livres in exchange for the prisoner of war, was a sparkling diadem of French chivalry. Charles VII, who owed his life and his crown to Joan, was much too busy to bend his little finger on her behalf. Joan was alone. There were no guardian angels.

The Maid now was a captive of the defeated Duke of Bedford who considered means of destroying the conqueror of his army. Destroyed she must be. On this judgment he was set.

But the means of executing this judgment presented problems for a civilized member of the English nobility. The Duke reflected that a summary order for the execution of a prisoner of war, without justifiable grounds, would be contrary to military conventions. Review of Joan's military campaigns failed to warrant the lodging of a charge carrying with it the death penalty.

Joan's tactics, the duke was forced to acknowledge, were superior to those of any of his field commanders whom she had captured or defeated. The Maid of 20 victories had trampled into the dust the battle standards of proud English regiments. She had nullified the long string of victories which had marked the progress of the 100-year-old dynastic conflict between the two nations. Finally, the duke mused bitterly, this ignorant farm girl had outwitted him and ruined his prestige. Grimly he faced the prospect of returning to England with the remnants of an invincible army. He had failed, the duke reflected, with an army which, under his brother Henry V, crushed French chivalry at Agincourt.

Witchcraft Charged

Bedford reasoned that since Joan had never been trained in the military arts, her direction came from evil spirits. It was beyond her capability, he assumed, to achieve such victories without recourse to black magic. Therefore, the duke concluded, the French Maid was a witch. He decided that his military prisoner should and must be tried by ecclesiastic courts and, therefore, delivered her to his friend, Pierre Cauchon, the Bishop of Beauvais.

Cauchon, assisted by his staff of inquisitorial brain washers, struggled with Joan from 21 February to 23 May 1431. Alone, she fought the lot of them. On the witness dock and in the torture chamber her soldierly voice rang out clearly, distinctly, sincerely, and truthfully. All the legal trickery of the sophists failed to stump her. She did not break.

The specifications hurled at her were disproved. There was no basis for the witchcraft charge. She achieved victories by following sound military principles which are founded upon commonsense, not upon black magic. Likewise, the charge of sorcery was ill-founded; she had no connection with evil spirits. The charge of heresy constituted a matter of opinion.

Did Cauchon view Joan in the light of a heretic because she differed from his own personal views? Or because, as a soldier, she was uniformed in male attire? What connection did the charge of heresy have with her military status? If Joan had lost battles instead of winning them, would they have bothered with her at all? Was her sole crime, then, that of winning battles for the French?

However, Joan was doomed to lose a predetermined course. She was found guilty of heresy which is unrelated to sorcery or to witchcraft. On 30 May 1431, at the age of 19, Joan was dumped on a pile of faggots in the market place of Rouen.

Conclusion

Did the end justify the means? Yes and no.

On one side are her detractors—the Duke of Bedford and the Bishop of Beauvais. In the end they lost, yet in losing they contributed to the positive side of the question. For it was Joan, through her victories and death, who swept away the feudal pattern of life. And in its place rose fresh moral conceptions in the evolution of mankind.

Civilization and Christianity were redeemed 25 years later when Pope Calixtus III and Charles VII ordered a rehabilitation trial, annulled the sentence, and declared the trial nonexistent.

The barefoot girl from Domremy was not available for comment.

Command Management and You

Lieutenant Colonel James C. Wilkins, *Infantry*
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WHEN does a leader command? When does a leader manage? What is the role of command management in making military decisions? These and other questions immediately arise when command management is discussed.

Many officers resent even the mention of the word management in the military—primarily because they do not understand it. Yet the average officer may expect to be assigned duties involving command management functions for a large portion of his career. Therefore, it is reasonable that more thought should be given to this important subject.

Within the last two decades our Military Establishment has become the biggest business enterprise on earth. This colossal business demands high skills, efficiency, and good management to get the most out of the defense dollar. General Maxwell D. Taylor, Army Chief of Staff, stated the Army's policy in this regard:

The Army strives to get the most defense for the money from the resources provided for it. It spends its money prudently for the essentials of defense in accord with good business practices. It is constantly self-critical trying on its own initiative to uncover inefficiency and malpractice.

Functions and Tools

Military management (command management) in peacetime is, in many ways, similar to management functions practiced in large industries. A comparison of the functions of command in the Army and the functions of management in industry reveals that they are practically the same.

Army Command Functions	Industry Management Functions
1. Estimating	1. Forecasting
2. Planning	2. Planning
3. Organizing	3. Organizing
4. Commanding	4. Directing
5. Coordinating	5. Coordinating
6. Supervising	6. Controlling

Although three of the titles are different, the functions and goals are identical. Command in the Army and management in industry serve to achieve the same basic results.

Some of the tools used in Army command management functions are identical to those used by large industrial firms. These include:

1. Programing (setting the goals or missions to be accomplished).
2. Budgeting (includes the performance and cost budgeting system required to accomplish the programs).
3. Accounting (includes financial accounting and reporting system).
4. Industrial or management engineering schemes (work simplification and performance analysis or work measurement).
5. Management evaluation and improvement (review and analysis).
6. Manpower control (personnel management).
7. Communication (transfer of ideas).

Army command management procedures parallel those of industry. Successful military managers not only must employ proper procedures but also display leadership traits associated with outstanding commanders

Command Management System

The Army Command Management System is a specific example of the application of the "improving" principle of command management. The objective of this system is to establish a basis for improving management and operations in the Army Establishment. Management improvement is a function of command and must be given command emphasis if it is to be successful. However, also inherent therein is the responsibility of staff officers, operating chiefs, and supervisors to participate continuously in improvement planning.

Some of the more familiar management improvement activities which are designed to meet this objective include: incentive awards system, work simplification system, work measurement, performance analysis and review, cost consciousness, management and manpower surveys, supervisory development program, quality and production control systems, and the improvement of forms, records, and reports.

Work Simplification Program

Work simplification, a part of the Army Command Management System, is a tested device that has been used in industry for many years. Work simplification takes a complex operation and breaks it down into simple steps. Its objective is a better job with less effort in less time. The basic purpose of work simplification is to get more or better quality work performed, resulting in a more efficient operation. For success the commander must take positive action to ensure maximum participation of both military and civilian personnel in improving methods and procedures. Better methods, improved tools, better working conditions—all can be discovered when the worker and supervisor pool their efforts to find them.

A good example of work simplification in industry is the assembly line procedure. A complex job such as the assembly of an automobile is analyzed and broken down into simple steps that can be performed by relatively unskilled workmen. More automobiles are assembled at less cost and with less effort. The assembly line procedure and other industrial procedures are in use throughout Army installations and stations all over the world.

The Army takes advantage of improvements made in equipment, plant layout, and supplies to improve its operations. Some of these include electronic data processing machines (electronic brains), improved materials handling equipment, modern accounting and office machines, and other laborsaving devices. The Army must continue to learn from industry as well as develop work simplification procedures in its own units.

Performance Analysis System

The performance analysis or work measurement systems are designed to assist in developing work simplification. These are *quantitative* analyses of production data as distinguished from *qualitative* analyses. This type analysis is designed to augment other techniques used by a good manager. For this reason extreme caution should be exercised in using performance analysis results as a basis for judging an individual's efficiency. Care also must be taken to maintain quality control while increasing production or a net loss in over-all efficiency may result.

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The performance analysis system collects, analyzes, and uses facts as experience factors to plan, devise, and establish standards or systems of evaluating performance. By using performance analysis results, the commander frequently is able to determine the amount of completed work which can be expected from like jobs and can isolate areas requiring more study or closer supervision on his part. At any rate, decisions may be made on the "authority of knowledge" rather than on that of arbitrary guesswork. Through the judicious use of the performance analysis data the task of estimating, programing, and budgeting can be made easier and more accurate.

Financial Management Plan

Another important management tool, emphasized by the Department of the Army, is financial management as an aid to over-all management. Financial management is only a part of over-all management and should be recognized as such at the outset. The Army financial management system has not yet had an opportunity to prove itself due to the time required to make the change from the old system. The ultimate objective of the Army financial management plan is to provide commanders at all levels with the means for more effective control over their financial resources to accomplish their assigned missions. This system evolves around the use of the dollar value for supplies, equipment, and services—*the cost system.*

Budgeting and accounting are regarded as the principal management tools employed in the financial management plan. The plan is based on three premises:

1. Army plans and programs must be translated into financial terms.

2. Financial results of operations must be recorded and reported as they are incurred.

3. Financial responsibilities must be fixed at the points where operations take place and decisions are made.

The major elements of the Army financial management plan are:

Cost of performance budgeting.—The accumulation and use of current and future estimated costs as a basis for budgeting.

Integrated accounting and financial reporting.—A single, comprehensive system of accounting and reporting. Prior to integrated accounting the Army had approximately 33 unrelated accounting systems, and at no level was it possible to reconcile this mass of financial data. Under the new system it is possible to obtain periodically complete financial statements showing the financial results of the command over a given period. This financial reporting allows the commander to compare similar operations.

Financial inventory accounting.—A system of accounting for property in dollar value and quantities. Each item of supply is priced and inventoried at its dollar value. Problem areas are more quickly disclosed to the commander under this method.

Stock funds.—Revolving or working capital funds used for the procurement, stocking, and issue of standard stock and common-use items. It provides the means for depots and installations to acquire, store, and issue (sell) common-use items without having to "rebudget" for these items year after year. This procedure reduces the amount of inventory required, transportation requirements, and paperwork. Stock funds are used in Army commissaries, clothing sales stores, post self-service supply centers, and similar activities. The money received for the sale of a uniform in the clothing sales store is used to purchase a replacement stock uniform from the depot; the depot in turn uses this money to purchase a replacement uniform from a manufacturer.

Industrial funds.—Revolving or working capital funds similar to stock funds and used by industrial type Army activi-

ties such as arsenals, printing plants, and laundries which produce goods or services for other agencies or activities.

Consumer funding.—The funds provided to the using agencies and installations to buy all goods and services needed in their operations. Consumer funds may be used by an agency to purchase supplies from stations or depots operating under the stock funding system. These are the funds provided to the customer.

Management funds.—The funds used for the consolidation and distribution of expenditures from two or more appropriations. These funds are commonly used in joint operations.

Internal audit.—This is an independent appraisal of financial operations to ensure adequate control. Within the Army it is an independent fact finding, fact reporting process conducted by the Army Audit Agency. The results of these audits are used to give the commander an appraisal of his financial policies and procedures, to report the accuracy of his financial records, and to advise him if his funds are properly protected and used, and whether he is complying with current regulations.

Manpower Management

A commander has three resources to carry out his mission—manpower, money, and material. Manpower probably is the most important and expensive of these resources. Over half of each defense dollar is expended for manpower. With manpower resources becoming more critical every day, increasing emphasis is being placed on manpower controls. Manpower is the most difficult commodity to manipulate, the hardest to control, and certainly the most intangible to evaluate in terms of the amount and kind needed to do the job. Although the commander is concerned with quality, he also must ensure that the minimum number of personnel consistent with his mission is being used, and that each individual is used to his maximum capability.

The process of determining manpower requirements for the numerous, varied, and costly activities of the Army involves the use of all the procedures and techniques developed by scientific management. In any situation where manpower requirements must be determined, the philosophy of "What is the minimum manpower needed for the job?" must replace the often applied philosophy of "Let's see how much we can justify." Manpower control and economy is an integral part of the management of Army business at every level.

Communication—Transfer of Ideas

Every officer is faced daily with the complexities of communicating ideas, instructions, or decisions to others. The art of speaking and writing clearly, briefly, and accurately has long been recognized in the Army as a quality of good leadership. The principle of "completed staff work" also emphasizes unity, accuracy, and clarity in staff communications. However, the staff officer or commander communicates not only with words, but also with his apparent attitudes and actions. Communication encompasses all human behavior which results in an exchange of meaning. The successful command manager must be able to adapt his attitude and manner to the occasion.

The commander should assign tasks and state policies in such a manner that there is no misunderstanding as to exactly what he desires. How well a commander manages may depend on his ability to communicate clearly and effectively.

Leadership and Command Management

Leadership is a vital element of command management. No matter how brilliantly conceived may be the commander's organization plan, concept of operations, or over-all management understanding,

successful operations are difficult to attain unless he, as the leader, has the will and the way to succeed. The leadership traits usually associated with successful tactical commanders are necessary for good management results. A brief review of the special leadership abilities or qualities required of the successful industrial manager points out that these are comparable to the list of military leadership qualities and are equally applicable to the military leader in command management. These include:

Technical knowledge.—An expert in his own line. Full knowledge of the work of others for which he is responsible.

Managerial ability.—The ability to plan and organize his work.

Training ability.—The ability to train himself and others.

Ability to chart a course of action and follow it.—The ability to determine where he is going and why; to establish goals within capabilities.

Ability to delegate.—The ability and the willingness to define, delegate, and share responsibility and authority wisely.

Decisiveness.—The ability to make prompt, accurate decisions after the facts have been obtained and analyzed.

Resourcefulness.—The willingness to act in the absence of directions or orders, the leadership trait of initiative.

Ability to consult with others.—The ability and willingness to consult with others, to use their counsel, and to give full recognition for it.

Use of Other Means

To attempt to run a "one-man show" in the field of management is an invitation to failure. The commander has a staff of qualified assistants, both military and civilian, which should be used to carry out assigned functions in the field of command management. As a manager, it is the job of the commander to get things done by (through) people. He must know how and when to delegate both responsibility and corresponding authority to his subordinates. In industry this key to effectiveness is known as decentralization. Responsibility, as well as authority, is decentralized as far down the line to subordinate facilities of the organization as is reasonable and practicable.

The command manager must use whatever means are available to maintain personal touch with employees, their problems, their aspirations, and their community. He may use troop information, group conferences, employee representatives, suggestion incentives, civilian advisory groups, civic organizations, post newspapers, and civilian news media to keep in touch with and encourage two-way communication.

Public relations plays a major part in the management system. General Taylor expressed his views in a letter to major commanders shortly after he assumed his office as follows:

The art of salesmanship is first to create a good product, then to make that product known at its true worth. A similar task falls to the senior commanders who are responsible for the quality of the Army. We have never questioned our responsibility in producing quality but have been slow and relatively inept in discharging the corollary responsibility of making the Army known at its true worth.

Good public relations will assist the command manager by imparting enthusiasm and pride in belonging to his employees.

Conclusions

It is apparent that there is little difference in the terms "command" and "management." Command, when combined with the term "management," may be used to include the principles of military leadership and the direction of efforts. Management, when used in conjunction with command, may be construed to include all those proved business and scientific management

practices as applied to the military. Thus *command management must include the best of "command" and the best of "management" to be successful.*

The basic functions of command management are similar to management functions used in industry. These are known in the Army as: estimating, planning, organizing, commanding, coordinating, and supervising.

Some of the tools of management used by the Army are:

The Army Command Management System.
The Army Work Simplification Program.
The Performance Analysis System.
The Army Financial Management Plan.
Manpower Management.
Communication.
Leadership.

General Ridgway, then Chief of Staff, US Army, stated in 1954:

The importance of sound management in our Army cannot be overestimated. I would like to emphasize that sound management practices are not something apart from Army practices, but instead are integral functions of Army command and leadership.

The tools of management are available —the wise commander will use them to the best advantage in carrying out his command management responsibilities.

While it is easy to say that the Army should base its solution to management problems upon the latest approved methods prevailing in commerce and industry, especially where these closely approach civilian conditions, it must always be kept in mind that the Army is imbued with the doctrine that it is proper to sacrifice money, material, or facilities when necessary to preserve lives.

The Army, it is true, is engaged in many types of business, but it faces management problems more diverse and complex than those found in any single commercial firm. The managers of industry, for example, are rarely if ever faced with decisions that may mean life or death of thousands of individuals—or affect the actual security of the Nation.

By virtue of his role in the Army organization, the Army officer must be primarily qualified to lead men in combat. But he must also be able to provide effective leadership in nontactical situations.

Because of the impact on the national economy of the costs of maintaining defense, all Army members must take every possible opportunity to learn and to place into practice sound management techniques and procedures.

General George H. Decker

TWO AIRBORNE RAIDS IN NORTH VIETNAM

Lieutenant Colonel Albert Merglen, *French Army*
Liaison Officer, U. S. Army Infantry School, Fort Benning, Georgia

DURING the eight years of war waged by the French Army in Vietnam against the Communist forces of the Vietminh, the two military actions which earned the greatest material and moral success—with the least losses and in the shortest time—were the airborne raids on 9 November 1952 at Phu-Doan, and on 17 July 1953 at Lang Son.

Due to the accuracy of intelligence information, the surprise, and the gallantry of the engaged units, these operations in the enemy's rear areas permitted the capture or destruction of important armament and ammunition dumps supporting all the Vietminh activity in North Vietnam. The increasing destructive power of nuclear weapons may well lead to an increase in the possibility of more little "brush fire" wars.

It is for that reason that the study of these two French airborne operations presents both historical and didactic interest. In an alliance the knowledge of an ally's experiences—failures and successes—is the basis of increase in efficiency.

After a brief outline of the general situation in Vietnam in October 1952, the planning and execution of the raids will be analyzed to include lessons learned during those operations.

General Situation

When the surprise Vietminh attack began on 19 October 1946 in Hanoi, the French Army had only about 30,000 men in Indochina (area of about 300,000 square miles, population, 29 million inhabitants). Initially, from 1946 to 1950, warfare was of the "guerrilla" type. Then, slowly, due to the Communist organization and the Chinese help, an open struggle took place from the end of 1950 to 1954.

When the Vietminh High Command launched the invasion of the Thai-country in the autumn of 1952, a balance of power had been reached. (Figure 1.) The objectives of the operation were conquest of a departure line against Laos, liaison with Siam, and capture of the precious opium crop.

At this time the Vietminh Army included, in addition to 300,000 local auxiliaries and 120,000 provincial "guerrilleros," a Regular Army with six infantry divisions and one artillery division of about 100,000 well-equipped and well-trained soldiers. On 23 October 1952 Red divisions crossed the Black River, moving toward the southwest. Supply for these troops came from the area of Tuyen Quang, via Yen Bay.

The French High Command, instead of dissipating their efforts in a frontal defense, decided to hit the line of communications and enemy dumps in the vital zone of Phu-Doan, between Tuyen Quang and Yen Bay. The attack of Yen Bay, advanced base of the Vietminh offensive action against the Thai-country, would have been the best maneuver, of course. However, the available means in ground and air

Partners in future alliances must be prepared to work and plan together now if they are to attain the ultimate in cooperation. This must include coordination of organization, technical development, and tactics

units were not sufficient to conduct such an operation. There remained only the possibility of undertaking an action against Phu-Doan, which was code named *Lorraine*.

Undertaken in October, *Lorraine* essentially was an expanded ground raid which started from Vietri. By early November a strong task force of infantry and armor had reached an area about 20 miles from the important crossroads of Phu-Doan, where roads and waterways came together to permit the supply of the Vietminh offensive.

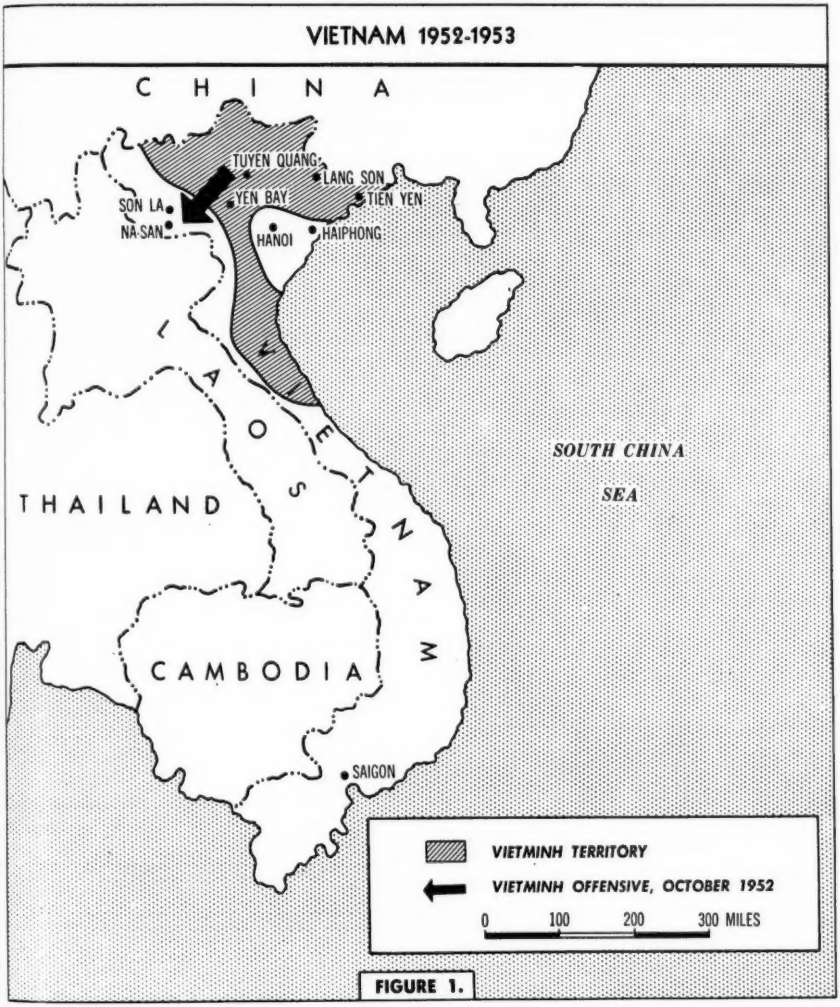

FIGURE 1.

Phu-Doan Operation

It was decided to launch an airborne operation of regimental combat team size on each side of the Song-Chay River to assure the destruction of dumps and installations of the enemy. A motorized column was to effect a linkup with the air-borne force. Code name *Marion* was given to the airborne operation. (Figure 2.)

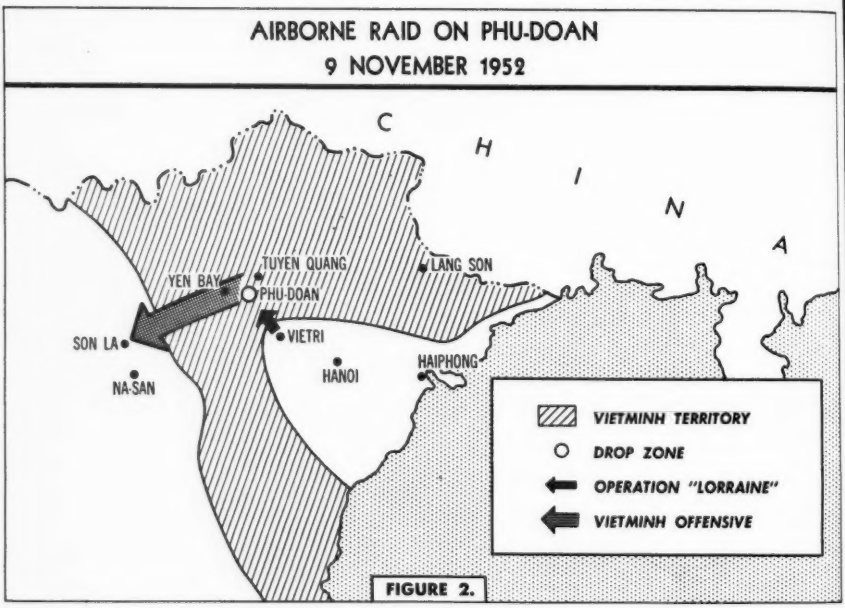

FIGURE 2.

The concept of operation was on the morning of 9 November to drop the force first to seize the crossing of the road over the river and the crossroads, and then to destroy the enemy's dumps. The infantry-armor task force, beginning its move during the preceding night, was to link up with the paratroopers during the day. The entire area would be mopped up for a few days before withdrawing to Vietri. It was known that the enemy had fairly strong forces in the region of Phu-Doan.

The airborne task force included three battalions (1st and 2d Foreign Legion Paratrooper Battalions, and the 3d Colonial Paratrooper Battalion), two platoons each of three 75-mm recoilless rifles, one platoon of engineers with crossing equipment, and one destruction platoon. Available for the operation were 53 *C-47's (Dakota's)* which were to fly two sorties each and would use Hanoi as departure airfields.

The plan provided for the simultaneous dropping of two battalions at 0930, one

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Lieutenant Colonel Albert Merglen has been an officer in the French Army for 20 years. From 1939 to 1955 he served with various units to include mountain, Moroccan, commandos, and paratroop in Europe, North Africa, Indochina, and Algeria. He was executive officer with the 2d Foreign Legion Paratrooper Battalion in the airborne raid on Phu-Doan and commanding officer of the battalion during the Lang Son attack. Upon his graduation in 1957 from the French War College in Paris, he was assigned to the faculty of the United States Army Infantry School where he is French Liaison Officer.

with the headquarters of the force on a drop zone north of the Song-Chay, the other on a drop zone south of the river. The drop was to be conducted after neutralization of the bordering villages by fighter planes, and under the protection of *B-26* bombers circling over the area during the operation. At 1230 another battalion was to be dropped on the northern drop zone. The jump altitude was 600 feet. The drop zones would be marked with smoke grenades launched by a pathfinder plane three minutes before the in-flight of the first serials.

Conduct of the Operation

The operation went off as planned—2,354 paratroopers captured the airhead at the cost of one killed and 16 wounded. At 1700 linkup was made with the motorized task force which assumed command of the airborne force.

Important armament, ammunition, and supply dumps were found. The following material was recovered: 34 mortars, 30 antitank rocket launchers, 14 machineguns, 40 submachineguns, 250 rifles, and two 57-mm recoilless rifles. For the first time a Russian "Molotova" truck was captured. The paratroopers carried out the mopping up of the area, destroyed armament factories and food dumps, and dispatched long-range patrols in the direction of Yen Bay with very few losses. On 16 November, after a week of operation, they were brought back by trucks to Hanoi.

Unfortunately, this fine success was dimmed by a last-hour reverse. When the ground task force of *Lorraine* withdrew two days later as planned, the rear guard was ambushed by two Vietminh regiments and lost both men and matériel.

This operation highlighted the fact that although the capture of dumps in the enemy's rear areas is relatively easy by an airborne operation, it is very dangerous to stay there too long, exposed to a concentrated counterattack from enemy reserves.

Operation *Lorraine*, undertaken with weak forces, succeeded only in hindering the Vietminh offensive in the Thai-country, and did not stop it. The capital, Son La, was captured by the enemy before the end of November, and the French command was obliged to regroup its isolated units around the airfield of Na-San.

The paratrooper battalions which had jumped on Phu-Doan were air-transported to Na-San two days after their return to Hanoi. General Gilles, commander of the airborne forces in North Vietnam, assumed command of the defending forces. Three Vietminh divisions tried in vain to overrun Na-San and were forced to withdraw from the Thai-country with heavy losses.

Lang Son Operation

During the spring of 1953 a new Vietminh offensive on Laos failed in a campaign in which the paratrooper battalions again distinguished themselves. A degree in balance of power was attained. The Vietminh forces, however, were receiving increasing assistance from Communist China. To cut this logistical stream, an airborne operation, called *Hirondelle* (Swallow) was planned. The objective of the operation was Lang Son an important supply dump installation in the enemy's rear area. (Figure 3.)

The problem was one of capturing the town and the well-guarded dumps, and destroying material and installations. All this had to be accomplished and the airborne force returned to friendly territory before the Vietminh troops could react. The terrain, mountainous and wooded with only a few roads and trails, presented additional difficulties.

The enemy had available at Lang Son one local battalion and two provincial companies plus a few light antiaircraft units at the Chinese border, a distance of about eight miles. Elements of an infantry division located near Thai Nguyen could be available in approximately 48 hours. Be-

tween Lang Son and Tien Yen eight provincial companies were in a position to react during the first day and from four to six battalions the second day. It was, therefore, imperative that the operation be completed as rapidly as possible.

Concept of Operation

The concept of operation announced by General Gilles was to execute an airborne attack the morning of 17 July in order to capture and destroy the dumps near Lang Son and to seize the crossing over the Song-Ky-Cung. This crossing, in the vicinity of Loc-Binh, constituted the essential point for the withdrawal. A ground action assisted by units attacking from Tien Yen was to take place from 17 to 21 July to permit the withdrawal of the paratrooper force by way of Loc-Binh and Dinh-Lap, to Tien Yen.

The airborne task force included a headquarters, three battalions (6th and 8th Colonial Paratrooper Battalions, and the 2d Foreign Legion Paratrooper Battalion), and one platoon of engineers with 14 rubber boats. The pick-up or link-up column consisted of three infantry battalions, three "commandos," one tank platoon, and one company of engineers with three bulldozers. One paratrooper battalion and a battery of 75-mm recoilless rifle (airborne) were held in reserve on the departure airfields in Hanoi.

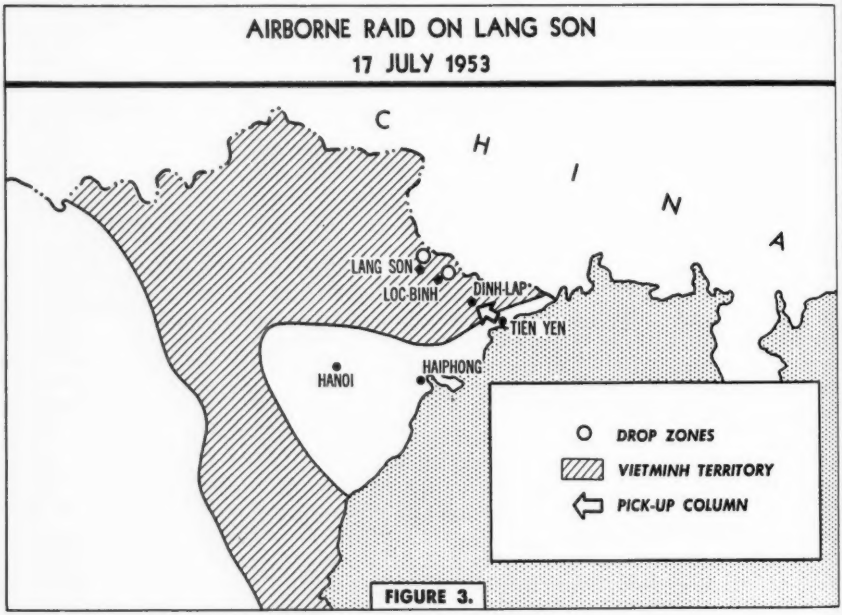

FIGURE 3.

Success of the operation depended upon complete surprise as to the date and location of the raid. For that reason all the preparatory planning was accomplished with the utmost secrecy by the force commander assisted only by an officer of G2. The G3 orders were put in written form on 15 July; the units were alerted at 1400 on 16 July and confined to barracks. At 1500 on 16 July the battalion commanders' briefing was held.

Since the airborne units could take with

them only organic light weapons and equipment, air support was planned carefully. Fighter aircraft were to attack all installations and observation posts detected on aerial photographs which could intervene on the drop zones. This action was to take place 15 minutes before jump time. Air fire support during the jump and for the subsequent reorganization was to be provided. In addition, provision was made for continuous strafing and bombing cover and for on-call night illumination from aerial bombs.

The raid began 17 July at 0810 when the headquarters and two battalions were dropped from 56 *C-47's* near Lang Son. At 1200, near Loc-Binh, the third battalion with the attached engineer platoon jumped from 29 *C-47's*.

The operation took place as planned. The Vietminh units were surprised completely. The local policemen and the provincial companies fled. Only the guard detachments of the dumps resolutely resisted. Important dumps were discovered and prepared for destruction by special teams. A large quantity of material was captured.

At 1600 the dumps were destroyed and all roads leading to the south and west were mined. The two battalions at Lang Son began their withdrawal. Meanwhile, the Loc-Binh battalion had secured the crossing over the Song-Ky-Cung and was protecting the flank against movement from the Chinese border.

At 2300, 18 July the first scouts of the airborne force met in the vicinity of Dinh-Lap, the ground column fighting up from Tien Yen. The engineers were able to repair the winding road to some degree and trucks took the paratroopers back in the last daylight hours of 19 July. On the morning of 20 July the airborne units were embarked in LCT's to be brought back to Haiphong, and then by trucks again to Hanoi. Of the 2,001 paratroopers who jumped in the operation, losses had been extremely light: one killed, one missing, three died from exhaustion during the march, and 21 wounded.

This remarkable success, considering the small forces engaged, had a profound repercussion in North Vietnam. The Vietminh war effort was hampered notably in the vital area of the Red River Delta. A wave of confidence spread through the friendly population and the army.

General Lessons

The two briefly described airborne raids were accomplished in a theater of operations of a particular type. It is, therefore, difficult to draw from them general lessons valid for all types of wars. However, some points are worthy of emphasis and could apply to other theaters.

First, intelligence is extremely important and must be centralized at the highest command level in order that it may be adapted to the ever-changing situation. Due to thorough research combined with the patient questioning of thousands of refugees, the intelligence agency in Hanoi had succeeded in drawing up an exact, precise, and detailed picture of the drop zones and their vicinity, and of the location and strength of the enemy units. Intelligence officers have a tremendous responsibility in operations of this type.

Second, if the information is correct, it is relatively easy to operate in the enemy's rear areas. It is very difficult for the enemy high command to have a clear appreciation of the situation, particularly if the airborne raiders do not remain in the same place but move at once. The most difficult problem is that of returning to friendly territory. In some circumstances, and in difficult zones, it is possible to split up the airborne force in small groups in order either to stay in the enemy country, or to return to friendly territory.

Third, all objectives are suitable for an airborne raid whether they be military, political, or economical. The sabotage of an industrial research plant may be as

important for the final victory as the elimination of a "quisling" government.

Fourth, it must be kept in mind that the varied possibilities of airborne raids can be realized only when the necessary means—that is, trained airborne units and planes in required quality and number—are available. The French High Command in Vietnam always was aware of the advantage of using paratroopers. In December 1950 there were 6,000; in 1951 about 11,000; and in 1954 more than a dozen picked battalions, half of them in the Vietnamese Army, were available with airborne support units of artillery, engineers, signal, and medical corps. The greatest shortage was in aircraft. This is a lesson to be remembered: it is not enough to have many, well-trained airborne units when the corresponding number in planes is not assured.

Fifth, the airborne raid involves a calculated risk. However, if carried out with imagination and daring the benefits far outweigh the risks involved.

Conclusion

An airborne raid has many advantages in the event of a localized war, and particularly at the beginning of a conflict. The army that is provided with trained airborne troops and sufficient troop-carrier and assault planes possesses great flexibility. An airborne operation or a great number of airborne raids may well permit the attainment of vital objectives which otherwise would require large ground forces and extensive operations.

To attain the ultimate in cooperation the partners in future alliances must be prepared to work and plan together now. A common endeavor of organization, of technical development, and of doctrinal understanding would be of great benefit.

The French paratroopers, with many gallant actions behind them, stand ready imbued with the motto: ***Who dares, wins!***

New firepower and mobility capabilities, plus new and improved means of control, permit wide flexibility in selection of the maneuver plan. Tactics should be designed to locate the enemy, determine his configuration, deliver appropriate fires on acquired targets, and exploit the resultant situations with highly mobile forces. On a strategic level, forces must be organized and equipped so that they can be delivered by air or surface transportation to any area of the world for engagement in either atomic or nonatomic situations on any reasonable type of terrain. Suitable air and surface lift must be provided. The time of initial intervention, particularly in limited war, may be just as important as the time required to close a sizable force.

Brigadier General T. F. Bogart

ATOMIC AIR DEFENSE

Lieutenant Colonel Jack C. Evans, Jr., *Artillery*
Faculty, U. S. Army Command and General Staff College

THE time—071500 Aug 1958.

The place—Tactical Air Force Airfield F-22, Eastern theater of operations.

The warning sirens had started about 45 seconds ago.

A blinding white flash filled the heavens just south of airfield F-22. Every man in sight had fallen to the ground or braced himself in place for the shock he knew would follow.

First, the roar of the explosion forced itself through each airman's protecting hands to punish his ears. Then came the pommeling shock wave; its remaining power nothing more than a brief reminder of the killing force it had lost since leaving the exploding *Nike* atomic warhead. The force of the blast rose and fell like an ocean wave reaching higher up the beach with the rising tide.

Here and there an airman cursed his own stupidity for failing to wear the goggles issued him to protect his eyes from temporary flash blindness. The crash crew already had started toward the spot where a temporarily blinded tractor driver had run into a parked aircraft before he could stop. Each man fought the impulse to search the skies to see what had happened. They knew from former experience and training that, should another atomic burst occur, such curiosity might result in permanent injury to their eyes.

Gradually, the siren ceased and the activity on the flightline began to resume its normal tempo. The mechanics conjectured curiously over Aggressor's latest effort to penetrate the theater's air defenses. Was the *Nike's* target an aircraft this time? Perhaps it was another of Aggressor's guided missiles. Few doubted that it carried an atomic weapon. All were exuberant over the success of the Army-Air Force team that effectively had nullified the enemy's latest effort. They had just seen the team perform efficiently. They understood in general terms the organization and planning that had gone into this effort. Their squadron commander personally had briefed them on this vast and intricate network of radar, communications, aircraft, and guided missiles. While not dissecting each organization and piece of equipment in detail, he emphasized the following critical problem areas and the methods of coping with them.

History

By the end of 1956 the Armed Forces of the United States had integrated air-to-surface (bomb) and surface-to-surface (missile) delivered atomic weapons into their weapons systems and into their units. Joint command and staff procedures and problems had been sifted thoroughly. The basic decisions concerning responsibilities and coordination of effort had been made. The services were in the process of preparing their doctrinal manuals covering employment of these weapons and finaliz-

It must be assumed that every enemy aircraft or missile is carrying a nuclear weapon. Efforts to destroy this delivery capability before launch or to destroy the target after launch must be given high priority

ing details of coordination to include field exercises. Methods of employment within the services were firm.

In early 1957 the advent of the surface-to-air (missile) atomic capability in the form of the improved *Nike* pointed up the necessity for reexamining the existing joint and intraservice doctrine on air defense. Obviously, the uncontrolled use of atomic warheads was beyond question, but the following problems had to be resolved without delay.

1. Which service should control this type firepower?
2. What specific controls are required?
3. Will the advent of surface-to-air atomic warheads change the air defense mission of any service? If so, how?

In recognition of the decisive impact that failure to cope with enemy aerial attack could have on any future conflict, an air defense doctrine was propounded in 1957. Its essential elements still are in effect today and will be as long as manned aircraft are used for tactical military purposes.

Vital Necessity

Through his employment of atomic weapons, delivered either by missile or manned aircraft, the enemy can halt and destroy our ground and air effort. The successful delivery of even a few large-yield nuclear weapons by the enemy is unacceptable. Therefore, efforts to destroy his delivery capability before launch and to engage and destroy him after launch must be given the highest priority. In order to ensure maximum effectiveness these efforts must be organized in such a fashion as to eliminate all except absolutely essential restrictions on the defending air and surface units. Further, it must be assumed that every enemy aircraft or missile is carrying a nuclear weapon. The advent of the surface-to-air, nuclear-armed missile employed in proper coordination with manned aircraft provides the capability of establishing the impregnable air defense that will prevent Aggressor's penetration.

The vital necessity for an effective air defense as outlined above, the air defense concept announced by the Secretary of Defense in 1956, and certain essential troop safety requirements form the parameters or guidelines for the air defense doctrine.

Troop Safety Considerations

The three basic troop safety problems connected with the employment of surface-to-air atomic weapons are flash blindness, other prompt effects, and psychological effects.

Particularly, when employed during the hours of darkness, atomic weapons bursting high in the air will cause widespread *flash blindness* unless appropriate precautions are taken. In the case of unwarned and improperly equipped vehicle drivers and aircraft pilots, this effect may well prove disastrous, resulting in many fatal accidents.

Other prompt effects (blast, heat, and radiation), while not effecting so wide an area as flash blindness, must be controlled specifically to avoid direct damage to friendly aircraft and ground troops.

The *psychological effect* that tremendous overhead explosions will have on unwarned troops must be taken into account. Thor-

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Lieutenant Colonel Jack C. Evans, Jr., was graduated from the University of California in 1939 and the U. S. Army Command and General Staff College in 1952. During World War II he served with the Ninth US Army G2 Section and the 195th Antiaircraft Artillery Automatic Weapons Battalion (SP) in the 2d Armored Division in Europe. He was on the faculty of the U. S. Army Artillery School during 1947-50. Other assignments include duty as commander, 80th Airborne AAA Battalion, 82d Airborne Division; and commander, 15th AAA AW Battalion (SP) and 57th Field Artillery Battalion, 7th Infantry Division, in Korea. As a member of the Korea Military Advisory Group, he served as advisor to the 22d Republic of Korea Division in Korea in 1954. Since 1955 he has been a member of the faculty of the USA CGSC.

ough indoctrination during and after the training phase is essential if troops are expected to continue to perform under these conditions.

Air Defense Concept

The Secretary of Defense set the stage for the air defense concept in a theater of operations when he published the following official statement in 1956 in his memorandum for Members of the Armed Forces Policy Council on the subject, "Clarification of Roles and Missions to Improve the Effectiveness of Operation of the Department of Defense."

In overseas areas, the US theater commander should normally assign responsibility for air defense to an air component commander with appropriate participation by other components. Under this arrangement, Army units in the combat zone should continue to be responsible for their own local defense, employing organic means. Other Army air defense units should carry out point defense missions under the air component commander. Air Force units should carry out the area defense missions. . . . As approved by the theater commander, the air component commander should establish such procedures for coordinating Army, Navy, and Air Force air defense forces as may be required to carry out his responsibilities, and, in addition, should establish such detailed procedures as are necessary for proper coordination with national air defense commanders of allied countries.

Thus we see the terms "area," "point," and "local" defense take on broader meaning in artillery air defense parlance than was formerly the case. In short, the "area" concept encompasses the entire theater of operations including its outer fringes and beyond. The "point" concept is used to describe the scope of the defense of individual targets or target complexes normally employed within the communications zone of the theater of operations. These points each may be many miles in diameter. Considering the range capability of Air Force equipment as compared to that of Army equipment, the obvious solution then is to assign responsibility for the "area" air defense mission to the Air Force. The Army, then, is assigned the "point" defense mission and, when it has organic, assigned, or attached air defense units, the Army is responsible for its own "local" defense. (See Figure 1.)

The advent of the nuclear-armed surface-to-air guided missile dictates an immediate, realistic, and practical solution to the problem of coordinating effectively all our means of countering enemy aerial attacks. This solution must include attacks made by missiles as well as by aircraft. To ensure positive coordination among the elements of the Army, Navy, and Air Force within the theater of operations, the theater commander establishes the Joint Theater Air Defense Command. An Air Force officer heads this command since the Air Force has responsibility for the broad, over-all "area" air defense of the theater.

Joint Theater Air Defense Command

The theater air defense commander is the operator for the theater commander for defense against aerial attack throughout the theater.

The theater air defense commander's major task is to assign appropriate missions to each service operating air defense units within the theater. He assigns missions so as to eliminate interservice interference in the air defense effort. Otherwise, the uncoordinated employment of nuclear warheads in the sky will create insolvable troop safety problems. The most obvious hazard requiring control is that to friendly aircraft, but the safety of ground forces also is involved.

From the theater viewpoint the planning goal for air defense is the establishment of an efficient air defense system using all means available—Army, Navy,

and Air Force. The theater air defense commander accomplishes this goal by subdividing the job into three planning tasks.

First, he assigns separate specific missions to each service participating in the theater air defense. These missions must be assigned with a view to eliminating interservice interference.

Second, he coordinates the efforts of all air defense elements to gain maximum efficiency and eliminate interference.

Third, he establishes necessary combat restrictions on both aircraft operations and surface-to-air missile operations to ensure noninterference and coordinated effort both theater-wide and within "point" air defenses. He incorporates these restrictions into a standing operating procedure (SOP), when feasible.

Army Problem

The nature of the target for Army air defense forces dictates very rapid execution of detailed air defense plans. The relatively short-range capability of both the Army's antiaircraft weapons and its target acquisition equipment leaves a minimum of time available for identification of the target, decision making, and transmission and execution of fire orders. This condition dictates the delegation of the "authority to fire" atomic weapons to relatively low command levels; for example, to the battery commander.

The perfection of equipment such as the *Missile Master* and the development of longer range missiles will make it possible to retain this authority at higher echelons, such as the battalion, group, or brigade.

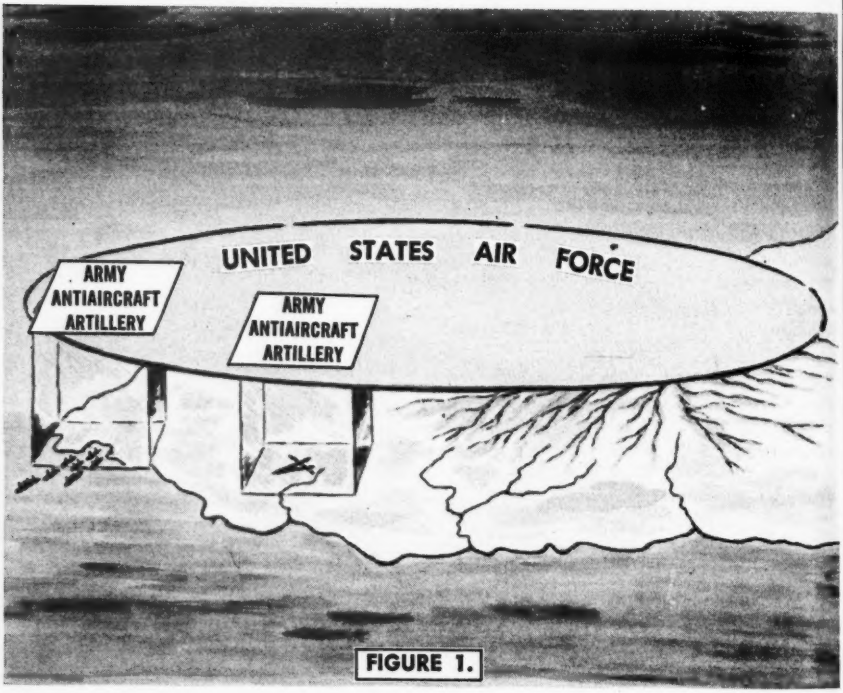

FIGURE 1.

Regardless of the level of control, however, the authority to fire is limited by the essential restrictions evolved through joint planning and issued by the theater air defense commander.

Since time for the decision on each engagement is so limited, the timing of planning and decision making must be quite different from the relatively deliberate and centralized methods used in the tactical surface-to-surface employment of atomic weapons. Planning must be done in detail before the appearance of the enemy aircraft or missile. Planning must be concentrated on establishing SOP's which incorporate the mandatory restrictions on the small unit commander. These plans must result in the establishment of an operational framework within which he can make decisions rapidly and deliver effective fire against the enemy air threat. These restrictions also must ensure missile control to avoid the inadvertent destruction of friendly aircraft; both those operated by the Army itself and those operated by the Air Force, Navy, and Marines. They also must provide for the safety of personnel on the ground under the area of employment.

Air Force Problem

The Air Force problem revolves around long-range target acquisition, target identification, interception, target destruction, and aircraft flight control to ensure troop safety. In the final analysis all these problems are the same as those facing the Army air defense units; however, there are two differences.

First, is the Air Force's requirement for *longer range* target acquisition to ensure early interception and destruction since the Air Force is responsible for long-range early warning of air attack.

Second, Air Force interceptors are *manned* aircraft. This introduces a troop safety problem in the immediate vicinity of the aerial target if it is to be placed under attack by both manned aircraft and ground based missiles. This troop safety problem dictates against the use of air defense guided missiles armed with atomic warheads and manned aircraft within the same portion of the air space over the theater of operations. It is the fundamental reason for the establishment of coordinating procedures between Army and Air Force air defense units. These procedures commonly are known as "rules of engagement." Such rules normally are designed to permit attack of enemy aircraft but at the same time minimize the possibility of attack or inadvertent destruction of friendly aircraft. The advent of the atomic warhead dictates positive prior arrangements to separate, areawise, the combat air defense operations of Army, Navy, Marine, and Air Force units.

Navy and Marine Problems

Suffice it to say that the air defense problem at sea is solely the Navy's. However, when located on or near the land masses of the theater of operations, the air defense capability of Navy and Marine units is under the operational control of the theater air defense commander. Again, missions assigned to these units must be designed to avoid operational conflicts with Army and Air Force air defense units. The Navy and Marines must be prepared to operate in close coordination with the Army and Air Force. Obviously, liaison personnel must be exchanged and appropriate communications provided. Indoctrination of their air defense personnel with the details of flight restrictions, rules of engagement, and other operational procedures presents the greatest problem to Navy and Marine commanders.

Assignment of Air Defense Missions

The fundamental concept as stated in the Secretary of Defense's memorandum is repeated:

Army units in the combat zone should continue to be responsible for their own

local defense, employing organic means. Other Army air defense units should carry out point defense missions under the air component commander.

In line with this concept the theater air defense commander assigns air defense missions to the Army, Air Force, Navy, and Marines.

Army Mission

Consider first the *combat zone*. Since the field army has the capability of defending itself within and to some distance beyond its boundaries, the theater air defense commander considers the entire combat zone as a contiguous series of "local" defenses within the theater. Thus each field army establishes a "local" defense. (See Figure 2.) The theater air defense commander uses the field army boundaries, which define the combat zone, as the limits of the "local" defense set up by each field army commander. He requires coordination of the activities of Air Force units in the air space over the field army by requiring them to coordinate planned flights through this air space with the field army. He also requires the field army to coordinate the employment of surface-to-air atomic weapons beyond its own boundaries.

The theater air defense commander accomplishes this by establishing coordinating procedures which permit the field army to employ surface-to-air atomic weapons beyond its lateral and rear boundaries or other predetermined limits over friendly territory in order to take advantage of the maximum range of the weapons. The field armies, therefore, are capable of defending themselves and assuming complete responsibility for the conduct of their defense, to include full control of the air space over the field army area within the provisions of the theater air defense SOP. This control of the air space is essential

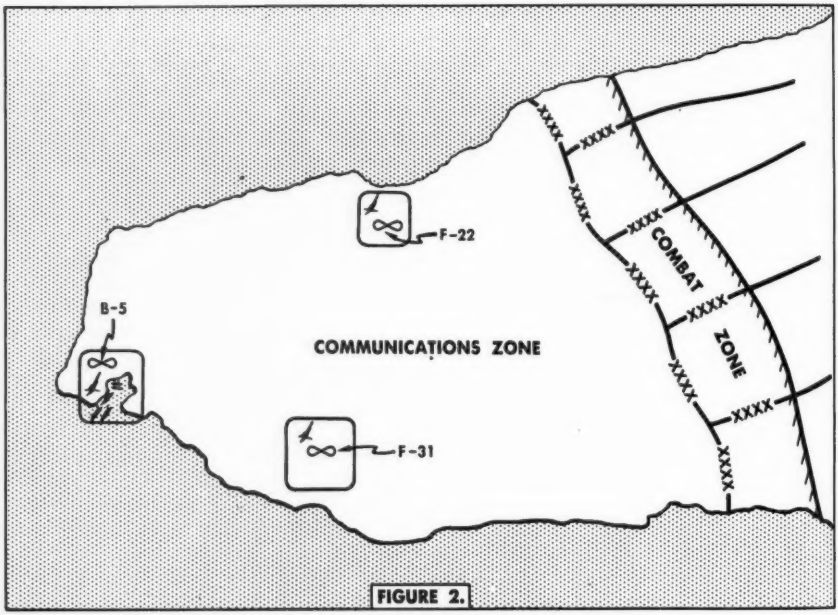

FIGURE 2.

to the field army before positive and workable troop safety measures can be put into effect.

Next, consider the *communications zone.* The theater air defense commander directs the establishment of additional "point" defenses in the communications zone as required. These are manned by surface-to-air units. Decisions to defend units or installations in the communications zone are predicated on air defense priorities submitted by all services having

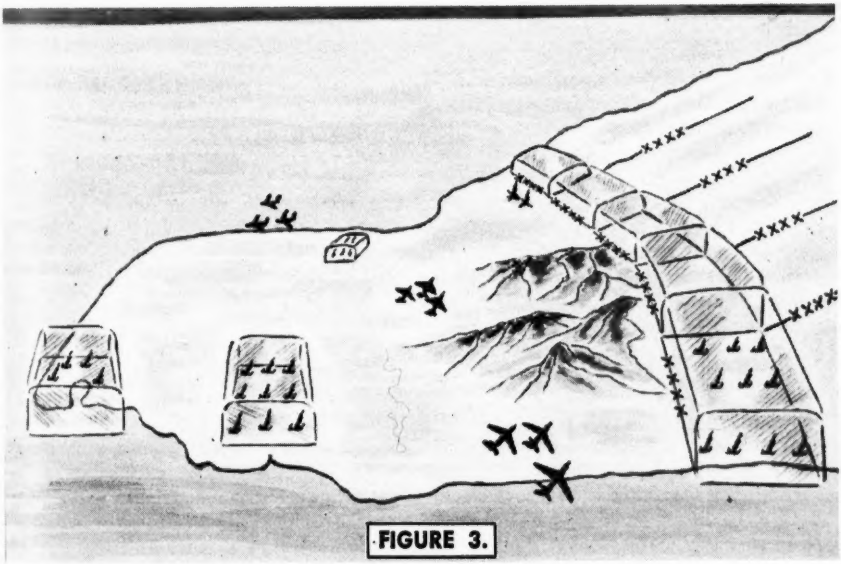

FIGURE 3.

installations and units in the communications zone and on over-all theater requirements.

Boundaries are established for each "point" defense. The same restrictions as those described for the combat zone on both Army and Air Force commanders are imposed with regard to limitations on missile firing and Air Force use of the air space. Here, again, the air space over the "point" defense is controlled by the Army since the Army is responsible for air defense of the specific point target. Again troop safety is a vital consideration.

Air Force Mission

In accordance with the Secretary of Defense's memorandum the Air Force is assigned the "area" air defense mission. This includes executing all air defense requirements, exclusive of "point" and "local" defense missions, required in the theater of operations. The vast reaches of air space around and between the relatively small "point" and "local" defenses are the Air Force's domain and its responsibility. (See Figure 3.)

This, of course, includes the outer fringes of the theater and beyond. This mission takes advantage of and properly utilizes the Air Force's flexibility and long-range capability both in target acquisition and aircraft. The existence of the "point" and "local" defenses does not hamper or unduly restrict Air Force operations since proper coordination early in the planning

of the theater air defense is required by the theater air defense commander. Further, the observance of the restrictions on flight freedom enables the Army air defense units to produce a far superior defense of the airbases from which the pilot flies. It also makes possible a practical solution of the troop safety problem.

Navy and Marine Missions

When they are within the territorial area of responsibility of the theater commander, Navy and Marine air units are placed under the operational control of the theater air defense commander. They should then be subject to the same general restrictions regarding "point" or "local" defenses as described for the Air Force. Navy and Marine surface-to-air strength is integrated into the nearest "point" or "local" air defense, if one is present. These units are subjected to the same restrictions that apply to the Army units manning that defense. If no "point" or "local" defense is nearby, the theater air defense commander may direct the establishment of a temporary "local" defense manned by these Navy and/or Marine forces.

Air Defense SOP

The theater air defense SOP is prepared by the joint staff of the theater air defense commander. It establishes the over-all command and organizational framework and responsibilities within which the air defense elements of the Army, Navy, Marines, and Air Force must work. It is the document which, coupled with the proper assignment of air defense missions, ensures coordinated effort by all services against enemy attack from the air. It includes those operational restrictions on both aircraft and missile employment deemed essential and serves as a basis for the development of air defense SOP's by the commanders of each "point" or "local" defense.

The air defense SOP restricts aircraft of the Air Force, Navy, and Marines from operating or employing air-to-air atomic weapons within the "point" or "local" defense boundaries without prior coordination. This restriction also increases the effectiveness of the "point" defense itself. To enable these and Army aircraft to leave and approach airfields which are defended by "point" defenses, requires the establishment of flight tunnels or corridors. The direction and altitude of these routes are varied according to plan to increase the security of the "point" defense. (See Figure 4.) Further, a minimum permissible height of burst for various yields of surface-to-air atomic warheads is established to ensure that casualty producing prompt effects do not reach the ground. These minimum heights of burst constitute one type of restriction on the artillery battery commander's authority to fire.

Field Army Air Defense SOP

The field army air defense SOP is developed under the general staff responsibility of the field army G3. The SOP actually is prepared by the field army artillery officer. It is coordinated through the field army central fire control agency with the air defense brigade, the Air Force, and the Navy and Marines, if applicable. Of course, it is coordinated with the theater air defense SOP during preparation. It should be prepared before the field army becomes operational and should be placed in effect immediately on assumption of control of a portion of the combat zone by the field army commander. It contains the rules of engagement and other restrictions on the small unit commander's authority to fire. This document provides the framework within which the artillery battery commander is authorized to fire atomic weapons for air defense. After staffing of the SOP is completed, it is presented to the field army commander for approval.

In addition to the rules of engagement mentioned here, the field army air defense SOP should contain instructions spe-

cifically concerning the following items:

1. Conditions of readiness for artillery units, such as "Standby," and "Red Alert," and delegation of authority to prescribe conditions of readiness.

2. Standing procedures for ordering or removing restrictions on authority to fire, such as "Weapons Tight" or "Weapons Free," and delegation of authority to issue such orders.

3. Standing procedures and responsibilities for evaluation and dissemination of intelligence on the enemy air activity and situation.

4. Standing procedures and responsibilities for establishment of liaison and communication with the Air Force, Navy, and/or Marines, when applicable.

In preparing the SOP full consideration must be given to the disastrous results that may occur through the inability of a battery commander to attack an enemy atomic weapon carrier due to unnecessary or cumbersome restrictions contained in the SOP.

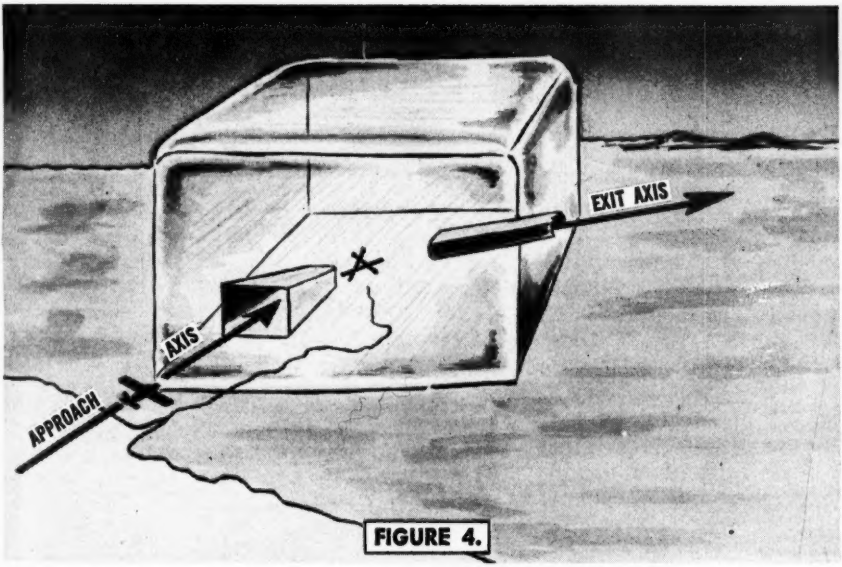

FIGURE 4.

Rules of Engagement

The theater air defense commander's organization for air defense and assignment of missions and responsibilities has simplified the need for rules of engagement for the surface-to-air units to the point where only these three are needed:

1. *Engage all aircraft or missiles which cross the "point" defense boundary outside an authorized flight tunnel unless positively identified as friendly.*

2. *When employing atomic warheads do not engage aircraft or missiles below the altitudes listed opposite the appropriate yield below:*

2 kiloton	4,500 feet *
10 kiloton	6,000 feet *

3. *Engage no aircraft or missiles outside the "point" defense boundary.*

Nuclear Allocation

The foregoing discussion of organization, responsibilities, and procedures assumes that nuclear warheads are available

* Hypothetical examples only.

to the surface-to-air unit. However, considering the scarcity and over-all tactical and strategic importance of the critical nuclear material, it is essential to analyze the effect that the competition by other essential missions for nuclear material can have on the available supply rate (ASR) of nuclear warheads for surface-to-air missiles.

The theater commander is allocated certain means by the Joint Chiefs of Staff to accomplish his mission. These means include personnel, specific units of all the services, and appropriate logistical support. A part of these means is a specific amount of nuclear material. The theater commander must decide on the numbers and types of atom bombs and warheads to requisition for support of:

1. The theater tactical air force offensive mission.

2. The theater naval and marine sea and ground mission.

3. The theater army tactical ground mission.

4. The theater air defense mission.

Once the basic decision on allocation is made at theater level, each service is aware of the amount of nuclear material available to accomplish its mission.

The theater army commander must balance the requirements of the field armies against those of the Army elements of the theater air defense command in allocating nuclear material. The decision in this regard must be coordinated at theater level with the theater air defense commander. The field army commander, in turn, must decide on the further suballocation of his available nuclear material between the support of the ground effort and the sup-

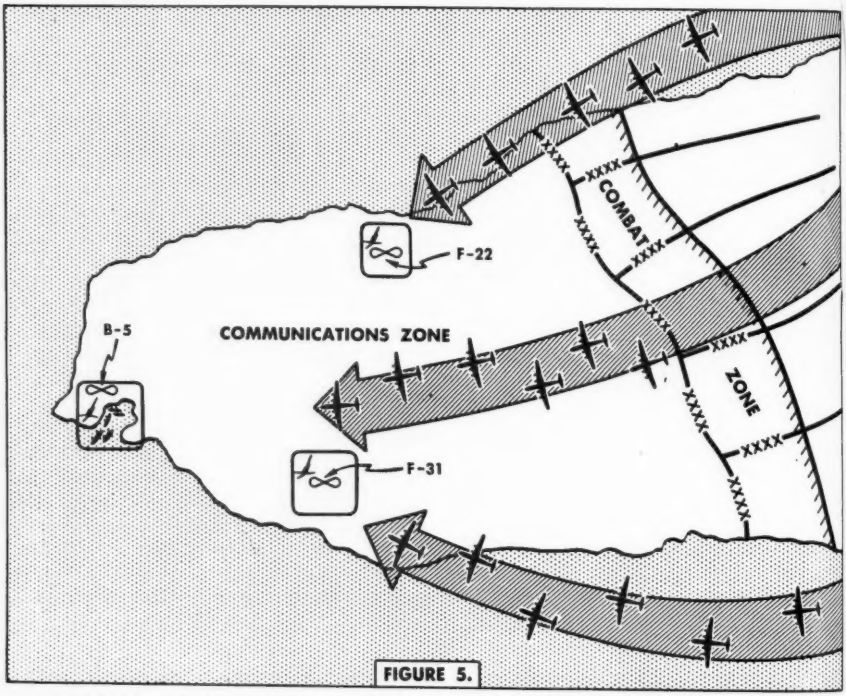

FIGURE 5.

port of the field army air defense. There is no necessity for a decision at field army level on the allocation of surface-to-air atomic weapons to corps since the direction of the enemy aerial attack cannot be predetermined and all of the surface-to-air missile units on the field army troop list are army troops.

However, the field army commander may desire to retain a portion of the army allocation of air defense atomic weapons in reserve for later phases of the operation. This can be done by establishment of an available supply rate (ASR) or by repeated allocations based on the accomplishment of the phases of the operation. At any rate this decision on the commitment of atomic means at the field army level is a difficult and a major one. It can have a far-reaching effect on the outcome of the tactical battle.

Since atomic ammunition supply for surface-to-air missiles will be tightly controlled and normally in limited supply, the high-explosive warhead which normally will be available in quantity should not be overlooked.

After Action Report

The engagement described at the beginning of this article was briefed for the theater air defense commander as follows:

071530 Aug 1958
ENEMY ACTIVITY

Aggressor launched a coordinated aerial assault against Airfields F-31, F-22, and B-5. The attack commenced at 1500 and continued in successive attacks until 1530. The maneuver consisted of a three-prong multiplane effort designed to saturate both the aircraft and missile capability of the theater air defense command. (See Figure 5.) Aircraft in each of the three prongs were phased in time and altitude in an effort to attract the fighters and missiles toward decoy aircraft and thus permit the penetration of enemy atomic carriers to the three airfield targets. Aggressor was successful in penetrating the air defense and delivered one medium-yield air burst atomic weapon on Airfield B-5.

Results:

Enemy aircraft destroyed:
—By Air Force —30 bombers
— 6 fighters
—By Army — 7 bombers

Enemy aircraft damaged:
—By Air Force —12 bombers
— 7 fighters
—By Army 0

Allied losses:
— 4 fighters from air-to-air combat
—12 medium bombers based at B-5
—Airfield B-5 rendered inoperative for an estimated two days by enemy atomic strike.

Although Aggressor made one penetration of the air defense, he sustained severe losses and did not achieve his objective which apparently was the destruction of Airfields F-31, F-22, and B-5.

/s/ Riggs
A3

Air defense organization and equipment of the North American Air Defense Command is portrayed on page 43.—Editor.

ARTILLERY OF THE PENTOMIC INFANTRY DIVISION

Major Robert M. Young, *Artillery*
Faculty, U. S. Army Command and General Staff College

THE emphasis in discussion of the Pentomic Infantry Division until now appears to have been placed upon the infantry reorganization alone. However, the division also has produced a striking reorganization of the supporting artillery.

The change, of course, is due largely to the superior power of the atomic weapon and the development of effective ground delivery means. Not only has the Pentomic Division commander been given the organic capability of supporting his force with atomic weapons, but he also has been given an extremely flexible division artillery organization with which to support his maneuver elements.

The Pentomic Infantry Division artillery is organized with a headquarters and headquarters battery, division artillery, and two battalions. (Figure 1.) One battalion is the field artillery battalion, 105-mm howitzer, towed and the other the field artillery battalion, general support (composite). Additional artillery support, when required, is obtained from corps. The corps artillery organization is such that antiaircraft and field artillery units will be attached to or reinforce division artillery to provide the level and type of artillery support required by the present mission of the division, scale of use of atomic weapons, geographical location, friendly force structure, nature of the enemy, and the form of war.

In order to provide the necessary support to the dispersed elements of the division and to exercise effective tactical control, each battalion normally has batteries of the other battalion attached. The net result is two battalions each with mixed calibers, capable of providing artillery support in a particular area, along an axis of advance, or to a particular force.

In order to accomplish the mission of directing and coordinating operations of division artillery and to provide control facilities for those units, headquarters and headquarters battery, division artillery, is organized as indicated in Figure 2.

The field artillery battalion, 105-mm howitzer, towed (Figure 3) is organized with a headquarters and headquarters battery; five field artillery batteries, 105-mm howitzer, towed; and a service battery. Organization of the 105-mm battery is indicated in Figure 4.

The field artillery battalion, general support (composite) (Figure 5) is organized with a headquarters and headquarters battery; two field artillery batteries, 155-mm howitzer, towed (Figure 6); one field artillery battery, 8-inch howitzer, towed (Figure 7); one field artillery battery, 762-mm rocket, self-propelled (Figure 8);

The organizational posture and tactics of the Pentomic Infantry Division have created a need for corresponding changes in both the organization and in the methods of employment of the division artillery

and a service battery. The organization of the headquarters and headquarters battery is the same as that of the 105-mm battalion.

The division artillery is designed to provide general and reinforcing artillery support to the battle groups of the division, under the concept that the organic mortar battery of the battle groups provide the close, continuous support. This concept

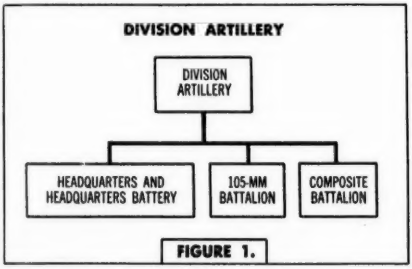

FIGURE 1.

normally negates the requirement for division artillery to place artillery in direct support of the battle groups. However, division artillery still may be required to place artillery units in direct support of the armored battalion, the cavalry squadron, a task force not possessing organic artillery, or a battle group that has lost its organic mortar battery.

An understanding of the organization is essential before the Pentomic Division artillery may be employed to the optimum degree of its capabilities.

Observation

1. *Aerial Observation.*—The artillery flight (10 *L-19* aircraft) of the aviation company supports division artillery. The flight officer, the S2, and S3 of division artillery schedule the flights, from the division artillery fire direction center (FDC) to provide continuous observation of the operational area when weather conditions permit. Artillery air observers are provided by (augmentation to) the tables of organization and equipment (TOE), two for division artillery headquarters and two per artillery battalion.

2. *Forward Observation.*—There are a total of 33 forward observers in the artillery units of the Pentomic Division. The largest group, 20, are in the mortar batteries of the five battle groups (four per battery). These forward observers of the mortar batteries, although not under division artillery control, are considered a part of the ground observation scheme of the division. The remaining 13 forward observers are directly under division artillery control, two in each 105-mm howitzer battery, one in each of the two 155-mm howitzer batteries, and one in the 8-inch howitzer battery. The forward observers of the division artillery batteries may be used to augment or supplement the observation of the battle groups, establish division artillery observation posts, or as forward observers with units not possessing organic artillery.

3. *Radar.*—There are two radar sections organic to the division artillery headquarters battery of the Pentomic Division. These sections presently are equipped with the *AN/MPQ-10.* They normally are employed by attaching one section to each of the two battalions and are placed in the immediate vicinity of a battery that is positioned well forward in order to facilitate communications, survey, security, and

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Major Robert M. Young was graduated from the University of Oklahoma in 1943; completed the Advanced Course of The Artillery School, 1952; and is a graduate of the 1956 Regular Course of the U. S. Army Command and General Staff College. During World War II he served in the China-Burma-India theater, and from 1947 to 1948 was Post S2 at the Wetzlar Military Post, Germany. He was with the 4th Field Artillery Battalion (Pack), the 40th Field Artillery Group, and the 756th Field Artillery Battalion from 1950-52. Prior to being assigned to Fort Leavenworth in 1955, he was S2, 42d Field Artillery Group, Seventh Army. Since July 1956 he has been on the faculty of USA CGSC.

logistical support. The section then furnishes countermortar information direct to the fire direction center of the battery or to the battalion FDC as directed. The battery or battalion FDC concerned forwards this information, together with the action taken, to the division artillery FDC.

Liaison

In the Pentomic Division there are two liaison officers in division artillery headquarters battery, one in each of the two battalion headquarters, and one in each of the five 105-mm howitzer batteries.

One of the two liaison officers in division artillery headquarters is a target analyst and assists the assistant executive of division artillery headquarters in the division fire support coordination center (FSCC). The other is employed as directed by the division artillery commander.

The one liaison officer from each of the two battalions is employed as directed by the battalion commander concerned, probably at division artillery headquarters.

The liaison officers organic to the five 105-mm howitzer batteries are employed in accordance with the mission assigned the battery.

Mission	*Establishes Liaison*
General Support	None required. They will be employed as directed by their control battalion headquarters.
Direct Support	With supported unit.
Reinforcing	With reinforced artillery unit.
General support, reinforcing a mortar battery	With reinforced mortar battery (FDC).
Attached (status)	As directed by commander of force to which attached.

In addition to the liaison officers of the division artillery there is a liaison officer in each of the five mortar batteries. They normally are employed as the mor-

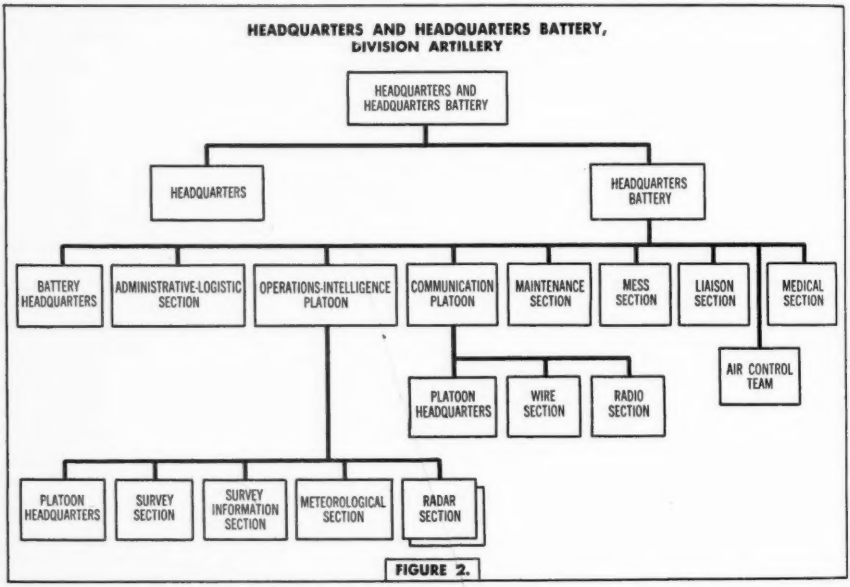
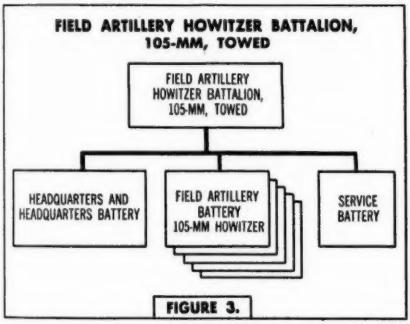


FIGURE 2.

tar battery commander's representative at the command post of the battle group to assist the battery commander in his role of fire support coordinator for the battle group commander.

Communication

The area communications system is not intended to replace the separate functional wire and radio systems of division artillery. The division artillery units will use the area system for administrative communication on a common-user basis. Artillery units also will be allocated sole-user channels for operational and fire direction communication where communication requirements exceed the artillery's organic capability and when their organic systems are disrupted. Each of the two battalions will enter the division area communications system through the nearest signal center. When the 105-mm howitzer battery is reinforcing a mortar battery it will receive fire missions either through the line to the FDC of the mortar battery or the area communications system.


FIELD ARTILLERY HOWITZER BATTALION, 105-MM, TOWED
FIELD ARTILLERY HOWITZER BATTALION, 105-MM, TOWED
HEADQUARTERS AND HEADQUARTERS BATTERY
FIELD ARTILLERY BATTERY 105-MM HOWITZER
SERVICE BATTERY
FIGURE 3.

Wire and Radio

A type wire system for division artillery is shown in Figure 9.

In addition to their principal operational and control nets all artillery battalions and batteries will listen on the division warning net and will use a common corps artillery survey frequency for control of survey parties and transmission of survey data.

Aircraft of the artillery flight will use the division artillery command and fire direction net. For adjustment of fire the division artillery S3 will direct the aircraft to the frequency of the battalion or battery which is firing the mission. When the aircraft are assigned specific missions under battalion or battery control, they will utilize a frequency of that unit.

Division artillery headquarters operates three internal radio nets, one a command and intelligence net (AM); a fire direction net (AM); and a command and fire direction net (FM). (Figure 10.) The command and intelligence net (AM) is used for control of the battalions and for transmission of target information. The fire direction net (AM) is used for transmission of fire requests from battalion to division artillery, fire missions from division artillery to battalion or batteries under division artillery control, time on target missions to all batteries, and meterological missions to all batteries. The command and fire direction net (FM) will be used principally for communication between elements of division artillery headquarters and airborne aircraft.

Each of the two battalions operate three internal FM nets. One is a command net used for control of attached batteries. The second is a primary fire direction net for transmission of fire requests from battery to battalion, fire missions from battalion to battery, time on target missions to all batteries, coordination of the massed fires of the battalion, and communication with aerial observers. The third net is an alternate fire direction net which is used by the 105-mm howitzer batteries when firing simultaneous missions and as alternate communication to the mortar batteries.

The 155-mm howitzer batteries use the command and fire direction net of the battalion to which they are attached as a

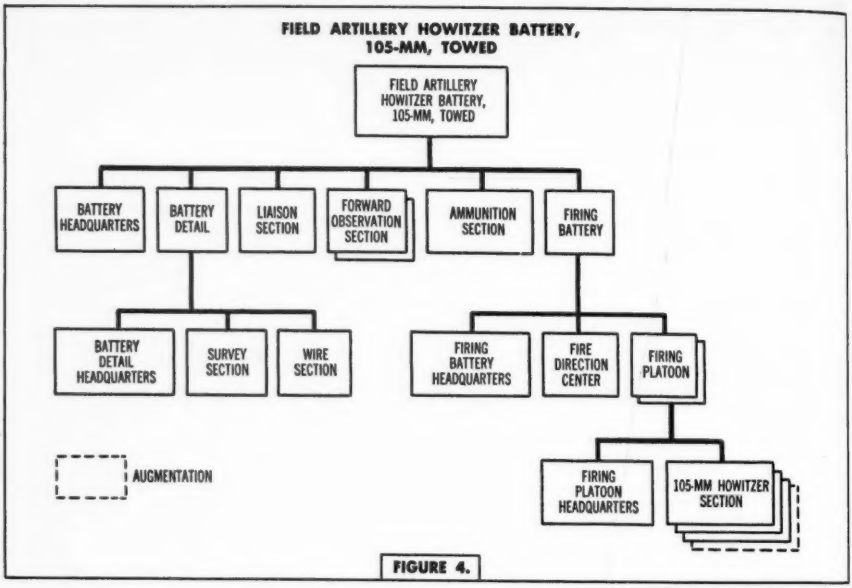


FIGURE 4.

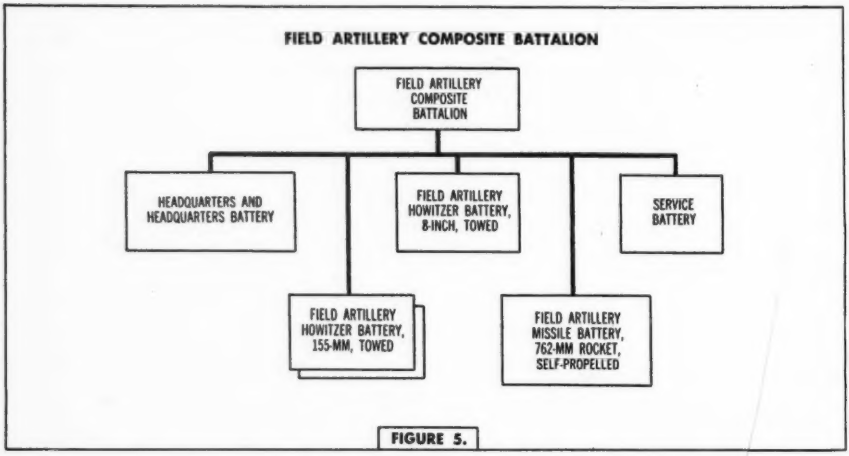

FIELD ARTILLERY COMPOSITE BATTALION
FIELD ARTILLERY COMPOSITE BATTALION
HEADQUARTERS AND HEADQUARTERS BATTERY
FIELD ARTILLERY HOWITZER BATTERY, 8-INCH, TOWED
SERVICE BATTERY
FIELD ARTILLERY HOWITZER BATTERY, 155-MM, TOWED
FIELD ARTILLERY MISSILE BATTERY, 762-MM ROCKET, SELF-PROPELLED

FIGURE 5.

battery command net and the battalion alternate FDC net for a fire direction net.

The 8-inch howitzer and the 762-mm rocket each operate one internal command and fire direction net (FM).

The 105-mm howitzer battery operates one internal command and fire direction net. The battery will operate in the reinforced mortar battery net to receive requests for fire. When the battery reinforces

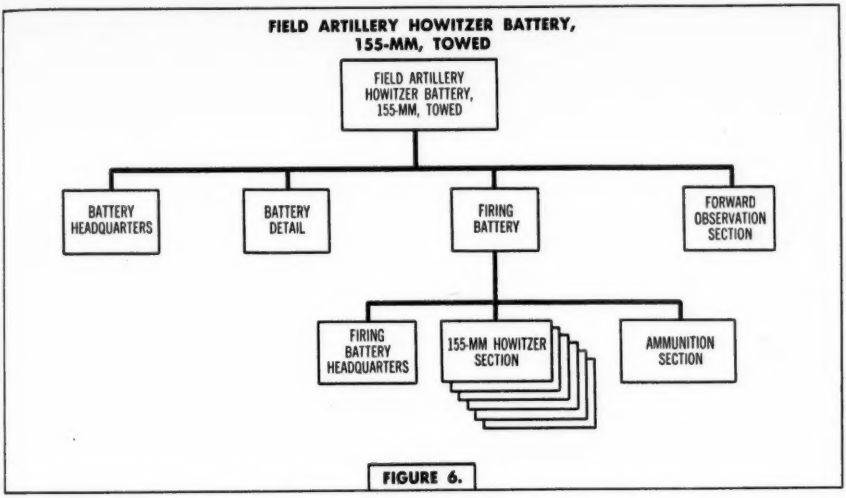


FIGURE 6.

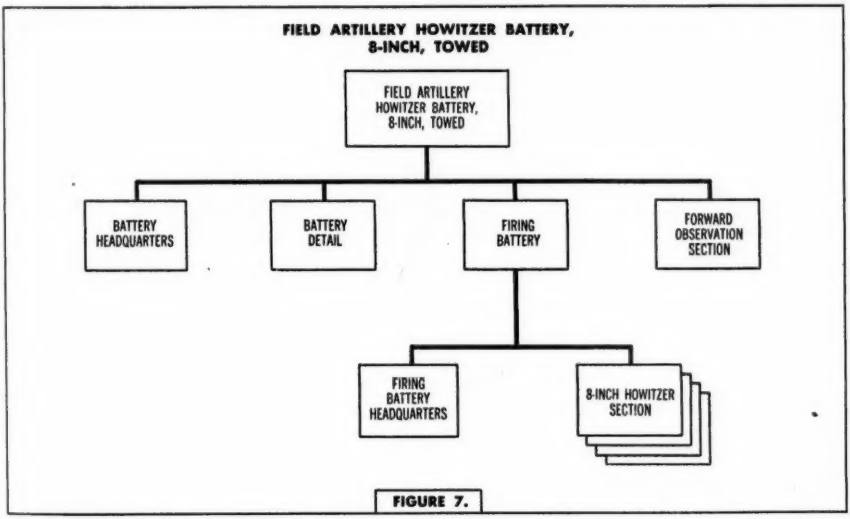


FIGURE 7.

a mortar battery it operates in the mortar battery command and fire direction nets but maintains contact with the artillery battalion to which it is attached. If the battery is assigned a mission of general support reinforcing the fires of a mortar battery it will operate in the mortar battery fire direction net and in the nets of the battalion to which attached.

Fire Direction

Perhaps, one of the most significant changes in the Pentomic artillery organization is the provision of a technical fire

direction capability within each of the batteries. Not only do the division artillery batteries possess this capability, it also is organic to the mortar batteries of the battle groups. This capability permits decentralized employment by battery for extended periods of time, an inherent requisite of artillery on the atomic battlefield. This technical fire control measure enables the firing batteries to receive target intelligence and convert it into fire commands without being dependent upon the battalion fire direction center.

Tactical fire control is the employment of firepower in regard to selecting targets; opening, suspending, or ceasing fire. While the two field artillery battalions possess a limited technical fire control capability they normally are expected to exercise tactical fire control. This tactical control is the type of fire control exercised by division artillery headquarters and artillery group headquarters in the past. Division artillery headquarters continues this practice and in the Pentomic organization the two battalions exercise this type control over the firing batteries attached to the battalion. The battalions select the batteries to fire, the target, the time of firing, and the type and amount of ammunition. This tactical information then is relayed to the technical fire direction centers of the batteries where it is converted into fire commands.

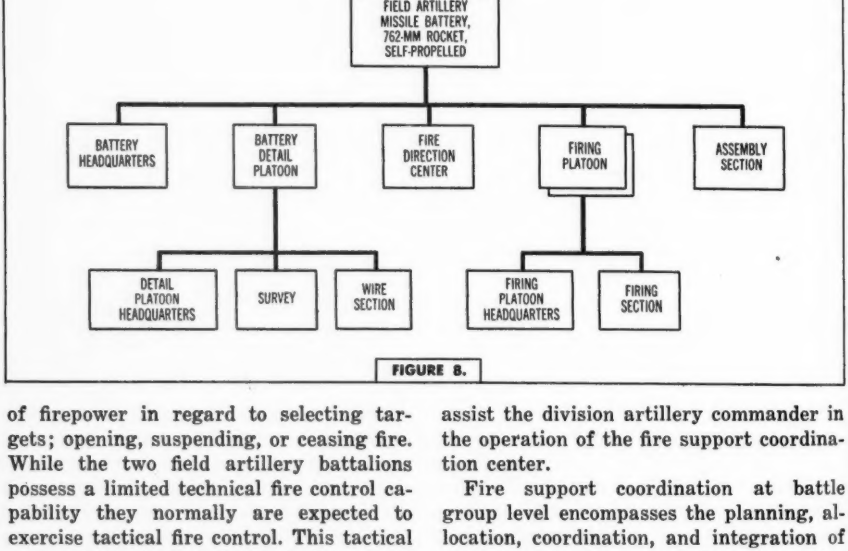


FIGURE 8.

Fire Support Coordination

The division artillery commander is the fire support coordinator for the division commander. The TOE of division artillery headquarters battery provides for a lieutenant colonel, a major (both with special weapons training), five enlisted men, and the required communication equipment to assist the division artillery commander in the operation of the fire support coordination center.

Fire support coordination at battle group level encompasses the planning, allocation, coordination, and integration of all supporting fires, and the preparation of the battle group fire plan. This is accomplished as informally as possible. The mortar battery commander is the fire support coordinator for the battle group and is assisted by his liaison officers. At company level his forward observers act as artillery advisors to the company commanders who normally will perform their

own fire support coordination. The battle group assistant S3 air, the forward air controller, and the naval gunfire liaison officer (when present) assist in fire support coordination.

responsible for fire planning or fire support coordination.

This concept is in keeping with the tactics of the new division and permits each of the two artillery battalions to furnish

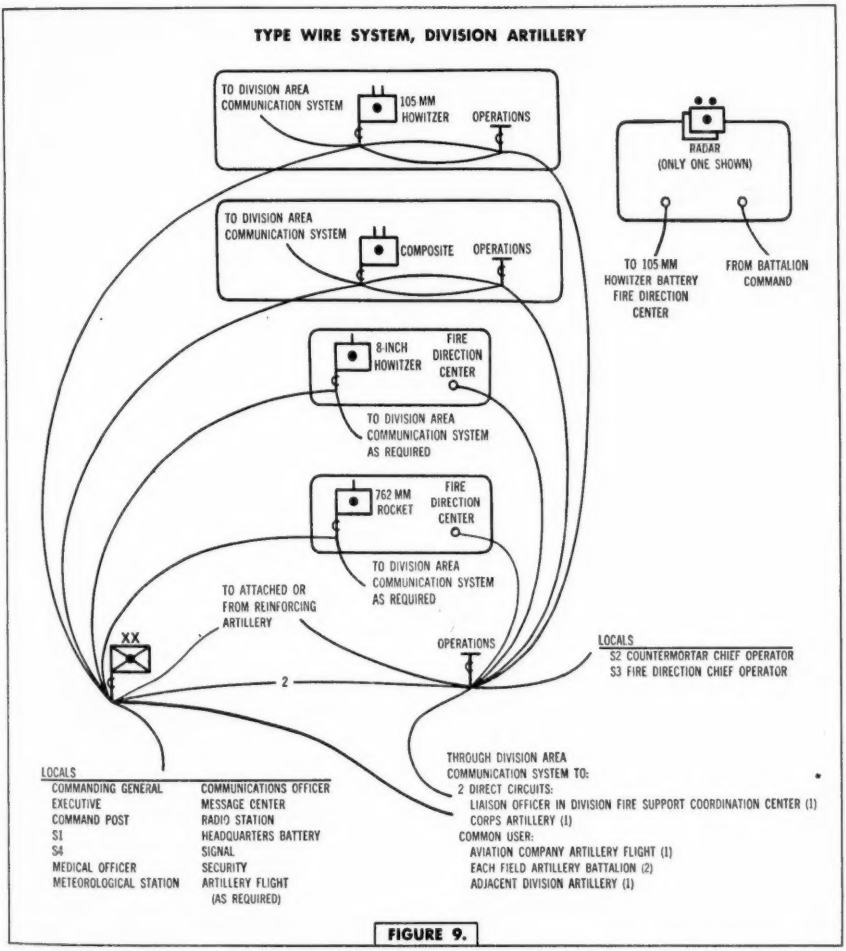


FIGURE 9.

The two battalions may be given the responsibility of specifically planning and coordinating fires in their portion of the division area. In the absence of these special instructions, the battalions are not

artillery support to one or more of the maneuver elements of the division in accordance with the division commander's concept of fire and maneuver. It also permits the two battalion commanders to con-

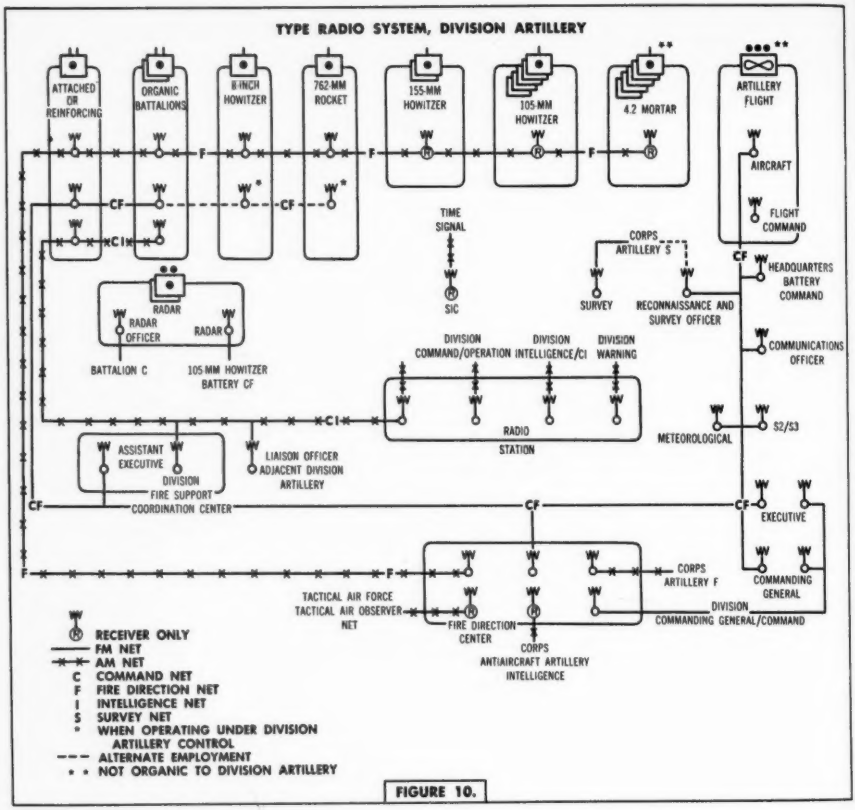


FIGURE 10.

centrate upon the tactical employment of their units while the fire planning and coordination is accomplished at the battle group and in the division fire support coordination center.

Air Control Teams

To implement the flexible organization of the division further, and to provide the battle group commanders with the support they require to accomplish their envisioned missions, an air control team (ACT) is organic to the mortar battery of each battle group. In addition to these ACT's there is one ACT in division artillery headquarters battery for a total of six in the division.

Survey

With division artillery units employed throughout an extensive area, survey operations from battery to division artillery level must be planned carefully to ensure establishment of survey control without delay.

To implement this survey task, survey sections comparable to the division artillery battalions have been provided to the batteries of the division artillery—with the exception of the 155-mm howitzer battery.

The two artillery battalion headquarters, the 105-mm howitzer batteries, the 8-inch battery, the 762-mm rocket battery, and the mortar batteries organic to the battle groups all have necessary survey capability. The 155-mm howitzer batteries are assisted by the division artillery survey section.

Employment

The organization of division artillery for combat emphasizes the principles of mass, economy of force, surprise, and maneuver.

The development of organization for combat is influenced by the mission of the division, the maneuver of the division and its elements, centralized versus decentralized control, weapons capabilities, position areas, the capabilities of the current tactical groupings, and future operations.

The organic mortar battery of the battle groups furnishes the close, continuous fire support for the battle groups. This organizational feature obviates the requirement for division artillery to furnish direct support fires to the battle group under normal conditions. It does, however, allow for the reinforcing of the mortar battery of each committed battle group with one 105-mm howitzer battery.

The battle group commander may retain the entire organic mortar battery in general support of the battle group, or he may place a portion of the battery in direct support of certain elements of the battle group. When the mortar battery is in general support of the battle group the following responsibilities are required:

Command: Organic to the battle group.

Liaison: To the battle group.

Communication: From the battle group.

Zone of fire: Battle group zone of action or as directed by battle group commander.

Forward observers: To each rifle company.

Displacement: On battle group order or at discretion of the battery commander.

The mortar battery normally will remain with its parent battle group. The responsibilities for fire planning to its parent battle group make it advisable to leave it with the group at all times, even while in reserve.

The one final consideration is the organizational structure of division artillery. As has been previously discussed, the widely dispersed elements of the division precludes either TOE battalion controlling all of its organic batteries. The result is two battalions of mixed calibers providing artillery support. This and the fact that all batteries have a technical fire direction capability permits the division artillery commander to use the firing battery as the basic building block in organizing for combat.

The two battalions will be given responsibility for supporting the division or designated elements thereof. To accomplish this responsibility the battalions will have attached the requisite type and number of batteries over which they will exercise tactical fire control.

The missions assigned by the division artillery commander are indicative of the type control he desires to retain at division level.

When the division artillery desires to retain tight control he may use the mission of general support, reinforcing as shown in the following example of paragraph 3 of the Operation Order.

3.

* * * * *

e. Division Artillery

(1) 1st How Bn, 45th Arty:
Btry A, B, C, 1st How Bn, 45th Arty.
Btry A, 1st FA Bn, 46th Arty.
General Support, Reinforcing. Reinforce 1st BG, 61st Inf with Btry A and 3d BG, 63d Inf with Btry C.

(2) 1st FA Bn, 46th Arty:

Btry B, 1st FA Bn, 46th Arty.
Btry D and E, 1st How Bn, 45th Arty.
General Support, Reinforcing. Reinforce 4th BG, 64th Inf with Btry D. Reinforce 5th BG, 65th Inf with Btry E upon commitment.

(3) Btry C, 1st FA Bn, 46th Arty: GS.
(4) Btry D, 1st FA Bn, 46th Arty: GS.

* * * * *

When he desires to decentralize control to the battalions, he may direct the battalions to support designated units of the division as shown in the following example.

3.

* * * * *

e. Division Artillery.

(1) 1st How Bn, 45th Arty:
Btry A, B, C, 1st How Bn, 45th Arty.
Btry A, 1st FA Bn, 46th Arty.
Spt 1st BG, 61st Inf, and 3d BG, 63d Inf.

(2) 1st FA Bn, 46th Arty:
Btry B, 1st FA Bn, 46th Arty.
Btry D, E, 1st How Bn, 45th Arty.
Spt 4th BG, 64th Inf; prep to spt 5th BG, 65th Inf when committed.

(3) Btry C, 1st FA Bn, 46th Arty: GS.
(4) Btry D, 1st FA Bn, 46th Arty: GS.

* * * * *

Upon receipt of the mission of support the commanders of the two battalions assign missions to batteries as the situation requires and make subsequent changes to meet changing situations. As previously stated, the artillery may provide a minimum of one 105-mm howitzer battery to reinforce the mortar battery of each committed battle group. Hence the battalion commanders must habitually consider this requirement in assigning missions to their batteries. In addition, these battalion commanders assume the responsibilities for coordinating necessary communication, liaison, fire planning, and other artillery procedures to ensure maximum fire support to the supported elements of the division.

The 105-mm and 155-mm howitzer batteries normally will be employed under battalion control and the missions assigned to the batteries will appear in the battalion operation order and in the division artillery fire plan. The 8-inch howitzer and 762-mm rocket batteries normally will be employed by battery under division artillery control with the mission of general support.

A cursory review of the decentralized capabilities of the artillery batteries coupled with their employment over wide areas naturally leads the experienced combat officer to the question of the massing capability of the division artillery. The massing capability and time on target missions were the attributes that made American field artillery famous in World War II. This capability still is inherent.

Field artillery has two principal missions:

1. It supports infantry or armored units by fire, neutralizing or destroying those targets which are most dangerous to the supported arms.

2. It gives depth to combat by counterbattery fire, by fire on hostile reserves, by restricting movement in rear areas, and by disrupting hostile command agencies.

The Pentomic Division artillery can accomplish these two missions with atomic as well as conventional fires.

NORTH AMERICAN AIR DEFENSE COMMAND

Material for this article was furnished by Headquarters, United States Army Air Defense Command, Ent Air Force Base, Colorado Springs, Colorado.—Editor.

THE North American Air Defense Command (NORAD) was established in September 1957 as an integrated headquarters designed to coordinate all North America's air defense forces in wartime, with Canada and the United States participating as equal partners. Complete operational control of the United States and Canadian Air Defense Commands was vested in General Earle E. Partridge, United States Air Force. As commander of NORAD, General Partridge is responsible and accountable to the Joint Chiefs of Staff of both Canada and the United States. Royal Canadian Air Force career officer Air Marshal C. Roy Slemon was appointed deputy commander in chief upon NORAD's formation.

Mission

The mission of the North American Air Defense Command in peacetime is to prepare plans and procedures for immediate combined air defense action by the separate forces of the United States and Canada in the event of hostilities. NORAD will have operational control of all air defense forces made available to it by both countries. The forces of both countries will, therefore, maintain their separate identities, responsibilities, and national characteristics. In wartime, however, the forces of Canada and the United States will operate as one to protect primary targets in both countries against any aerial invaders of North American air space.

United States components of NORAD are the Army Air Defense Command, the United States Air Force Air Defense Command, and United States Naval Forces. Each element contributes the weapons and defensive measures characteristic of its sphere of operations.

Army Air Defense Command

Headquarters of the U. S. Army Air Defense Command (USARADCOM) is located in Colorado Springs, Colorado, not far from the foot of famed Pikes Peak. From this location near the heart of the United States, the Army member of the jointly staffed North American Air Defense Command implements the Army's air defense mission of providing combat-ready forces and equipment for the air defense of designated localities such as vital Atomic Energy Commission installations, industrial complexes, population centers, and Strategic Air Command bases.

Commanded by Lieutenant General Charles E. Hart, USARADCOM is a combination of men and weapons that will, first, deter enemy attack by deployment of a powerful and ready defense force, and second, if an aggressor attacks, destroy hostile aircraft attacking the defended locality prior to reaching their objective.

Organization

For efficient and effective control, USARADCOM has divided the area of its responsibility into five regional com-

Coordination of all North American air defense forces in the event of hostilities, and the preparation of plans and procedures to effect this joint effort is the mission of the North American Air Defense Command

mands. The 1st Region has its headquarters at Fort Totten, New York; 2d Region headquarters is at Fort George G. Meade, Maryland; 4th Region headquarters at Richards-Gebaur Air Force Base, Missouri; 5th Region headquarters at Fort Sheridan, Illinois; and 6th Region headquarters at Fort Baker, California. The regional commands are, in turn, divided into "defense localities" which have a specific geographic identity to protect from any aerial attack. Batteries are carefully located in these defenses to provide maximum effectiveness and mutual support in their defense mission.

The Weapons

Initial objectives for deployment of the *Nike-Ajax* missile battalions were attained in 1957. With the rapid expansion of the surface-to-air guided missile system, the Army's traditional 90-mm and 120-mm gun antiaircraft weapons were retired from the defense scene in the Continental US. The Army now has placed its air-defense responsibility on the guided missile weapons of USARADCOM.

The Army *Nike-Ajax* surface-to-air guided missile was the Nation's first operational supersonic antiaircraft guided missile designed to intercept and destroy enemy aircraft. It has been on-site since 1953.

Nike-Ajax

The *Nike-Ajax* missile is a liquid-fueled, rocket type missile approximately 20 feet long and about a foot in diameter, with two sets of fins for guidance and steering. The missile and booster weigh slightly more than one ton. Its kill potential exceeded expectations from the start, and development work has continued to improve its capabilities. *Nike-Ajax* can meet an attack from any direction in any weather. By virtue of its aerodynamic configuration the *Nike-Ajax* can outspeed, outmaneuver, and destroy any present-day enemy bomber.

Nike-Ajax successfully has engaged every type of target against which it has been tested. These range from operational aircraft, radio-controlled drones, other guided missiles, and simulated targets flying at supersonic speeds. Designed to destroy large bomber craft of the conventional type, *Nike-Ajax* also regularly downs targets smaller than itself.

Nike-Hercules

Nike-Hercules will take its place in the Army's *Nike* air defense arsenal by the end of June 1958. This recently developed and test proved weapon has many times the destructive power of the *Nike-Ajax*. It is substantially faster and has much greater range. The *Nike-Hercules* is double the diameter of the *Nike-Ajax* and is extremely maneuverable at altitudes far in excess of those that are reached by the *Ajax*. Its higher velocity, furnished by a solid propellant motor, permits more distant interceptions of all types of aircraft, and its increased lethality makes *Hercules* one of the most effective weapons in America's air defense arsenal. The nuclear warhead capability serves to enhance further the effectiveness of Army weapons as deterrents to aggression.

Nike-Hercules is being integrated into *Nike* batteries already in position throughout the Nation. Where required, additional sites are being constructed. The new control equipment may be used for both *Ajax* and *Hercules* missiles. The new control equipment also will exploit the increased capabilities of the *Ajax* missile.

The *Hawk*

The low altitude capability of the USARADCOM defense will be reinforced as a result of the development of the *Hawk* missile, already in advance stages of testing. The *Hawk* (Homing All the Way Kill) carries a lethal modern warhead and is capable of destroying attackers flying at the lowest altitudes at ranges assuring effective protection of defended areas.

The *Hawk* uses a solid fuel propellant and is approximately 16 feet long and 14 inches in diameter. It uses guidance techniques which are unusually successful in hunting down and destroying the attacker. In addition, the *Hawk* radar is of unique design. The missile has a seeker in its nose which is highly effective in tracking low-flying aircraft approaching in the blind zone of conventional radars.

Nike-Zeus

The Army is actively engaged in the development of an antimissile missile. This weapon is called the *Nike-Zeus* and its principal function will be to provide a defense of the Continental United States against intercontinental ballistic missile (ICBM) and intermediate range ballistic missile (IRBM) warheads. *Zeus* is an actual development program in the hardware stage, not a study program. The Army considers an antimissile system technically and economically feasible. It has been estimated that the operational availability date of *Zeus* could be accelerated provided sufficient funds for rapid development and early production are available.

Fire Direction System

Programed improvements for key Army air defense installations in the United States include the electronic *Missile Master*, the first unit of which is already in operation as part of the Washington-Baltimore defense. *Missile Master* is the country's first electronic system specifically designed and utilized for coordinating the fire of antiaircraft missile batteries and other advanced Army weapons as they become available. *Missile Master* systems will be located at key antiaircraft installations in the United States. Each system can operate independently, and also can operate in conjunction with units of the Air Force semiautomatic ground environment area defense system known as SAGE.

The *Missile Master* system collects information on the location and identity of aircraft, presents this information on electronic displays, and distributes the data to the missile-firing batteries. In this way, each *Nike* battery receives a continuous flow of fresh data on all aircraft within the defense area, and on the activities of the other batteries as well; and each *Nike* battery commander is provided with all the information needed to enable him to make a proper selection of a target. By constantly observing the activities of all the batteries in the system, the *Missile Master* operators are able to direct a specific fire unit to a particular target, or to prevent friendly aircraft from being fired upon by our own weapons.

USARADCOM Aviation

The nationwide deployment of USARADCOM installations around population and industrial centers has created an intersite transportation problem which has been well-solved by the extensive use of Army aviation. Since a requirement exists for the transportation of both personnel and supplies, often with great expediency, it has been necessary to assign both fixed-wing aircraft and rotary-wing aircraft to the USARADCOM units.

Currently serving as the air transportation and liaison arm of USARADCOM are the following types of aircraft:

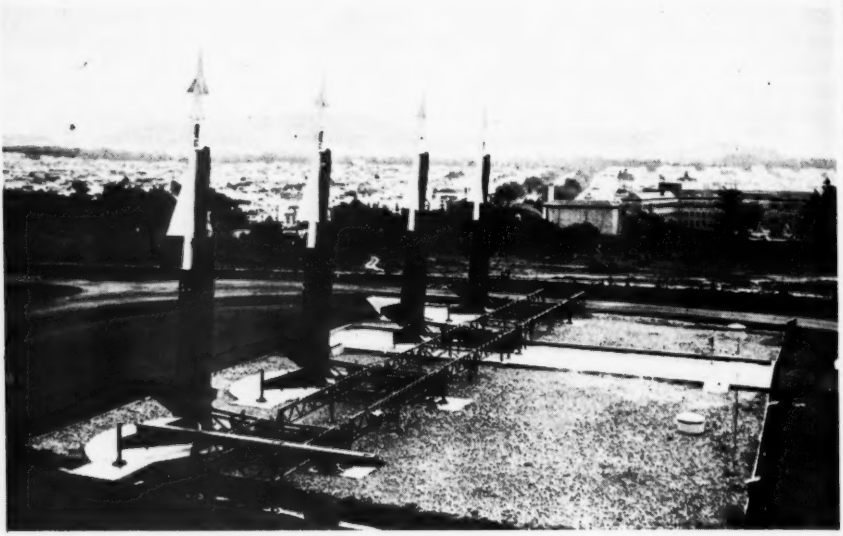
H-23 Raven.—A single engine helicopter which is an observation and reconnaissance class helicopter.

H-21 Shawnee.—A large single-engine twin-rotor helicopter utilized for light transport.

H-13 Sioux.—A single-engine helicopter incorporating a two-blade main rotor and two-blade tail rotor. It is a standard observation and reconnaissance class helicopter.

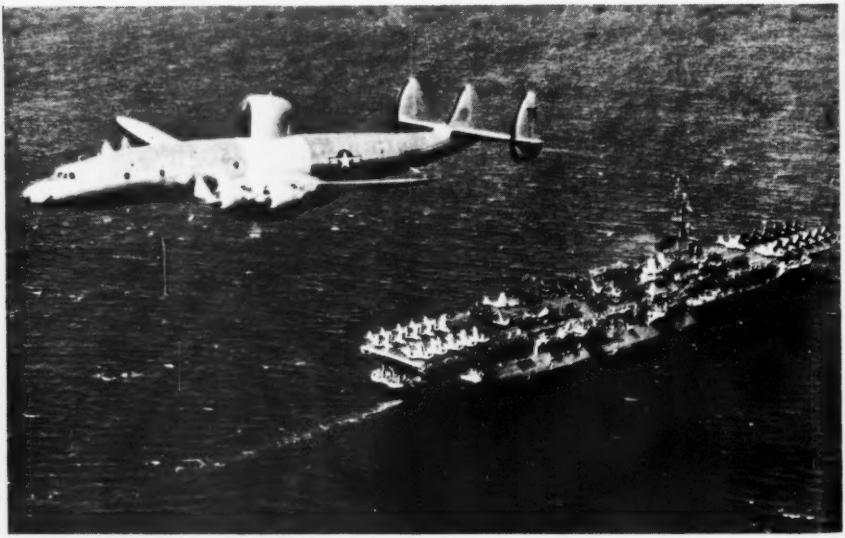
L-23D Seminole.—A command type twin-engine airplane used for command, liaison, and courier missions.

L-20A Beaver.—A utility type airplane employed for personnel and supply transport.



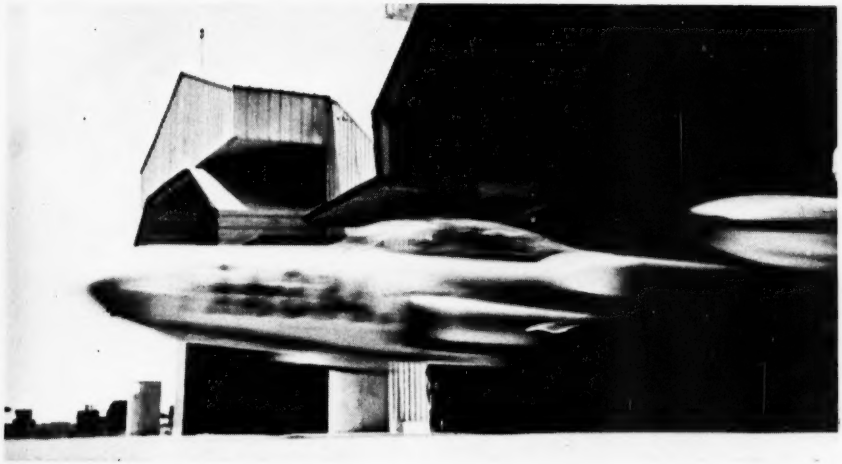
US Army Photograph

A *Nike* guided missile battery in the San Francisco defenses



US Navy Photograph

A Navy *WV-2* early warning radar plane

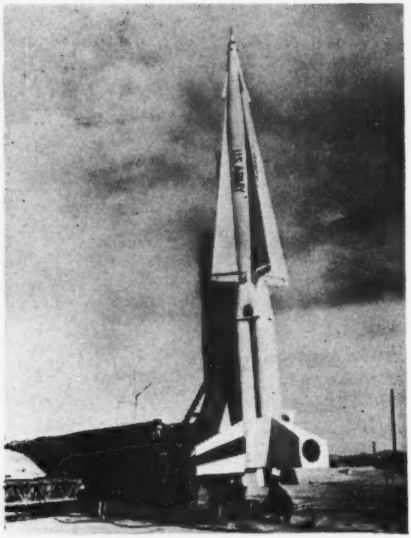


US Air Force Photograph

An *F-94C Starfire* jet fighter streaks out of the alert hangar during a "scramble"

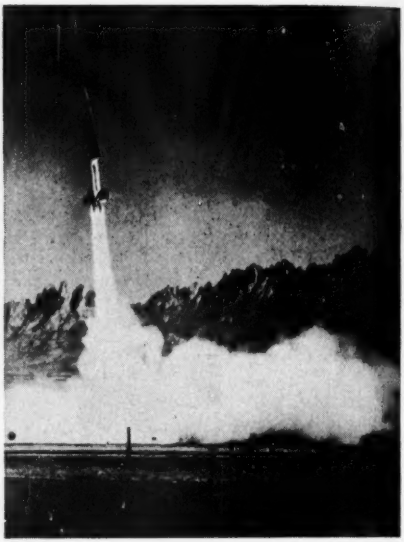
US Marine Corps Photograph

Four swept-wing *FJ2 (Fury)* Marine jet interceptors



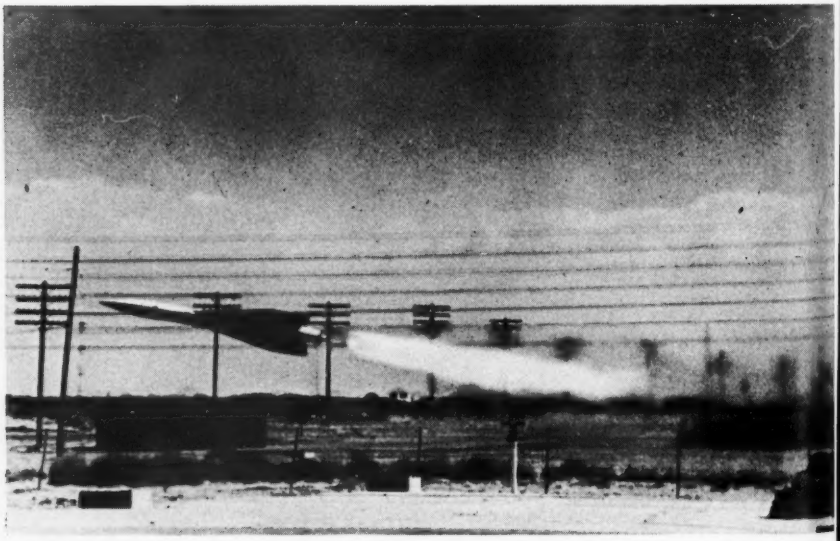
US Army Photograph

Nike-Hercules



US Army Photograph

Nike-Hercules in flight



US Army Photograph

US Army's *Hawk* in horizontal flight shortly after being launched

US Army Photograph

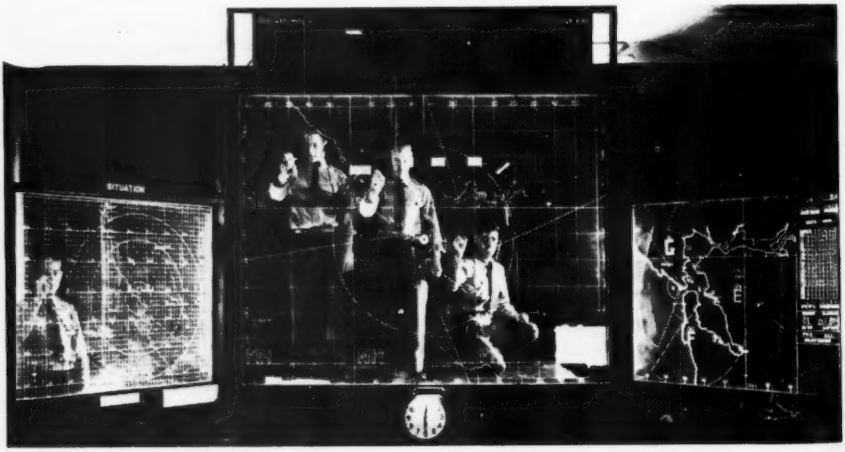
***Missile Master* tracking consoles**

US Army Photograph

Portable radar unit

US Air Force Photograph

Civilian ground observer corps volunteers and Air Force enlisted personnel at an air defense filter center



US Army Photograph

Army technicians man the situation, operations, and position boards at an antiaircraft artillery operations center

KEEPING PACE WITH THE FUTURE--
A Perspective of Larger Units

Colonel Hughes L. Ash, *Infantry*
Faculty, U. S. Army Command and General Staff College

This is the sixth in a series of articles expanding various aspects of "USA Command and General Staff College Keeps Pace With the Future," written by Major General Lionel C. McGarr, USA, Commandant of the College, and published in the April 1957 issue of the MILITARY REVIEW. *—Editor.*

THE purpose of this article is to show how the Department of Larger Units and Administrative Support (DLUAS) contributes to the accomplishment of the mission of the U. S. Army Command and General Staff College, and in so doing keeps pace with the future. This purpose is achieved by a description of the development of the DLUAS course of study; a synopsis of the content of the 1957-8 course together with the improvements already projected for 1958-9; and, the role of DLUAS in the College doctrinal program.

Under the direction of the Commanding General, US Continental Army Command, the College performs a threefold mission in support of the Army's educational objectives: instruction, development of doctrine, and support of training. Both the instructional and doctrinal missions are concerned with the command echelons of division, corps, field army, including their logistical systems and the theater administrative zone (communications zone).

The instructional mission involves:

The ability of USA CGSC students to perform command and general staff functions, as appropriate to their ranks, immediately upon graduation in peace or war; their ability, based upon USA CGSC education, to improve and progress over the years after graduation to perform these functions at the highest ranks in peace or war; their ability to adjust to likely conditions of future war; and as an implied responsibility, their ability satisfactorily to perform in a wide variety of worldwide field grade staff positions at nontactical headquarters immediately upon graduation, in accordance with established Department of the Army manning requirements.

Accomplishment of this instructional mission requires that USA CGSC instruction reflect appropriate balance between *education* and *training*; that treatment of both *operations* and *administrative support* (including logistics) be adequate and balanced; that instruction reflect both *present and future warfare* considerations; and that adequate coverage of *peacetime duties* be included.

The location of DLUAS within the cur-

In view of the advancing roles and missions of the services and the need for interservice teamwork, both the tactical doctrine and the spirit of interservice cooperation engendered in USA CGSC graduates are of vital importance to both the Army and the over-all defense effort

rent USA CGSC organization is shown in Figure 1. DLUAS provides the student, in regard to both *present* and *future* war, with: tactical instruction in corps (less airborne corps covered in the Department of Airborne Operations and Army Aviation), field army and *army missile commands*; instruction in the administrative support of large units (exclusive of this type support within divisions) including the use of logistical commands; instruction in joint operations (less airborne) including amphibious operations, air-ground operations, air defense, and instruction by sister service College representatives on their services, with emphasis on aspects connected with or involving Army operations.

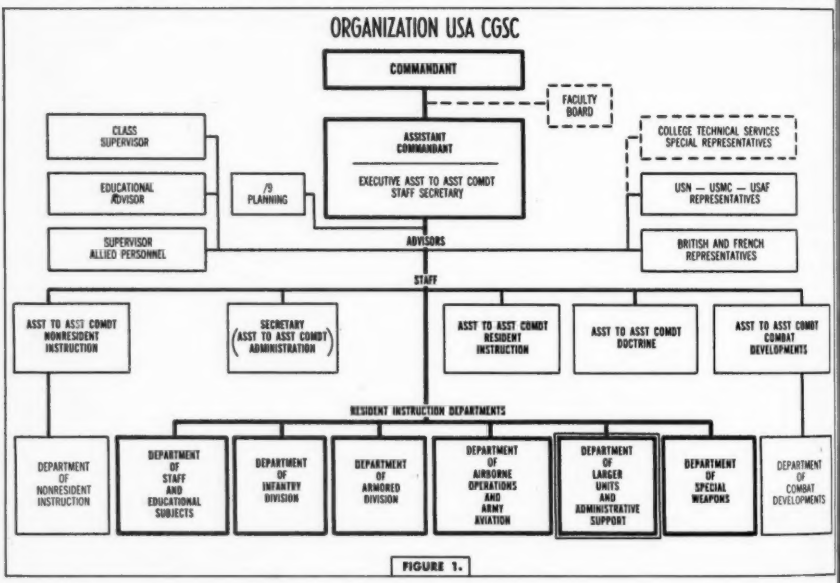


FIGURE 1.

Although this course of study covers the administrative support of larger units (corps and above) it does not include: instruction in division level logistics *specifically covered* elsewhere in the three departmental division courses of study (infantry, armored, and airborne); airborne corps logistics *specifically covered* in the airborne-army aviation course of study; staff aspects of logistics *specifically covered* in the staff course of study; technical atomic aspects of logistics support covered in the basic nuclear weapons course of study; and *additional* future warfare instruction covered by the Department of Combat Developments.

The organization of the Department of Larger Units and Administrative Support is shown in Figure 2. The functions of the sections are indicated by their titles which collectively indicate the instructional and doctrinal areas of responsibility of the department. The three "subcourses" derive their titles from section titles. The organization is based on authorship responsibility and doctrine, but affords maximum flexibility for presentation of instruction. Section chiefs supervise the preparation and presentation of instruction for which they are responsible, but frequently use

instructors from other sections to assist in presentation. This procedure is deliberately intended to facilitate department wide understanding of instruction and doctrine and to assist in proper integration of the varied subject matter assigned to the department. At the same time, it fixes responsibility in definite doctrinal instructional areas.

The DLUAS organization as shown in Figure 2 is effective for 1958. In the 1959 course of study field army administrative support will be reflected under the Corps and Army Section. The Administrative Support Section will have responsibility for all support in rear of the field army. Organizationally, this minor rearrangement makes a discrete instructional and doctrinal package and permits ready, accurate identification of instructional coverage.

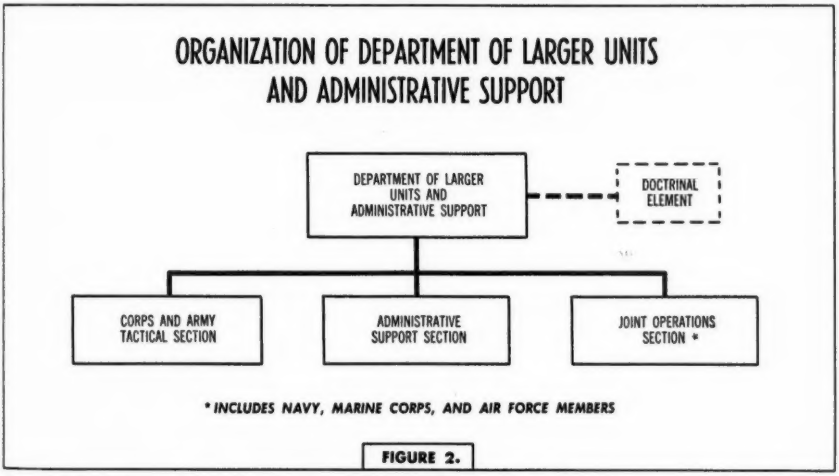

ORGANIZATION OF DEPARTMENT OF LARGER UNITS AND ADMINISTRATIVE SUPPORT
DEPARTMENT OF LARGER UNITS AND ADMINISTRATIVE SUPPORT
DOCTRINAL ELEMENT
CORPS AND ARMY TACTICAL SECTION
ADMINISTRATIVE SUPPORT SECTION
JOINT OPERATIONS SECTION *
* INCLUDES NAVY, MARINE CORPS, AND AIR FORCE MEMBERS

FIGURE 2.

The Doctrinal Element of the department consists of selected officers whose service as author-instructors has demonstrated the necessary experience and creative ability to supervise and contribute to the development of new and improved doctrine. At the department level, and in consonance with College level direction and policy, this element creates new concepts, guides and directs the preparation of current doctrine within the department, and coordinates doctrinal matters with other departments and agencies of the College. Aside from the department's Executive for Doctrine, who functions under the direct supervision of the department director as chief of the doctrinal element, all other members of this element are assigned to sections of the department. This arrangement facilitates contact with instructors and awareness of the requirements for new doctrine generated in the classroom or in the preparation of instruction. It also permits the section chiefs to express their doctrinal views through their doctrinal representatives. Officers functioning with the doctrinal element are assigned to such duty on a full-time basis. This element is not designed to handle all of the department's doctrinal task, but rather to provide a creative spark and to ensure direction, continuity of effort, coordination, and consistency.

DLUAS is staffed with officers from the combat arms and from each of the technical services. In addition, as does the College, DLUAS exploits career logisti-

cians. Full use is made of the vitally important specialized experience and skills of the officers from the technical and administrative services. They are utilized in the preparation and presentation of appropriate instruction and in the development and review of doctrine.

Representatives from the sister services prepare and present instruction on their own services and assist authors throughout the College in the integration of instruction on their services into applicatory exercises. They also assist in the actual presentation and discussion of these subjects.

Development of DLUAS Course of Study

As indicated in earlier articles of this series,[1] the College curriculum consists of the courses of study designed under integrated College control by the several functional instructional departments. This approach to curriculum design permits the College to present a carefully constructed, well-balanced program of instruction which is sufficiently flexible to afford shifts in emphasis immediately responsive to doctrinal development. Thus an over-all College balance is reflected in the allocation of curriculum hours to the various courses of study along with the delineation of the scope of each course of study. In addition, College level controls are formulated for Subject locales, forms of war, scale of use of atomic weapons, and for phases of instruction and similar matters. Establishment of these controls at College level ensures the proper balance within the curriculum as a whole.

The Commandant's Annual Curriculum Guidance and Decisions on the Curriculum delineate the scope of the DLUAS course of study and the allocation of curriculum hours thereto. The implementation of the essential College controls is prescribed in subsequent College Guidelines which include "subjects to be emphasized" in integrated instruction. Thereafter, DLUAS drafts a College Directive for each proposed subject.

The College Directives break out the block of hours assigned to the DLUAS course of study into individual Subjects, or units of instruction. Each directive sets forth a subject title, scope, and a definite number of hours. These draft College Directives are presented to the Faculty Board and the Commandant. These comprehensive presentations afford each department head a detailed view of the entire curriculum, thereby facilitating understanding of the curriculum as a whole and expediting the coordination of individual Subjects. When approved by the Commandant, they become College Directives to DLUAS, and constitute the DLUAS portion of the College Curriculum Plan.

Department Directives next are prepared for each subject. They are more detailed, are based upon the College Directives, and are responsive to College controls as discussed above. Department Directives outline to the individual author the content of his Subject, to include a strategic setting, problem sequence, subject coverage, methods of instruction, and design of night study assignment. They are drafted by the author, coordinated with interested authors within DLUAS and other departments, and approved by the Department Director. The detailed coordination to which these directives are subjected precludes undesirable duplication and ensures comprehensive coverage.

Based upon his approved Department Directive, the author proceeds to prepare his unit of instruction, continuing the detailed coordination initiated incidental to the formulation of his directive. Much latitude is accorded the author to encourage initiative and to ensure the timely inclusion of the most recently developed doctrine and concepts. His directive re-

[1] "Keeping Pace With the Future—Resident Instruction," Colonel James L. Frink, Jr., *Military Review*, February 1958.

quires the author to report doctrinal gaps encountered in writing his subject and to process *new* concepts developed therein. This action is taken through the DLUAS doctrinal element and constitutes a productive source of doctrine.

Upon completion of his subject, the author submits it to department review. DLUAS policy prescribes a formal review board, consisting of all section chiefs and chaired by the Department Director. Representatives from the staff, the sister services, the liaison sections, and other departments participate in the review on DLUAS initiative, depending on the nature of the subject to be reviewed.

After approval of the College Directives the preparation of next year's course of study occurs concurrently with the teaching of the present course. An orderly, evenly distributed workload is programed by estimating the date of presentation of the subject, then back dating for the time required for instructor preparation, printing, review, and for authorship. This approach to subject preparation affords maximum flexibility in authorship resources and ensures the opportunity for inclusion of the most recent doctrinal developments in instructional material.

In designing the DLUAS course of study, continuing attention has been devoted to the *total effect* on the student. For example, if every corps problem is portrayed in a general war setting, the student could logically conclude that a corps habitually fights in a general war. Should a corps invariably consist of one armored and three infantry divisions, the student becomes stereotyped in his concept of our highly flexible corps. Similarly, administrative support problems must be presented in underdeveloped as well as in highly developed areas.

The DLUAS course of study is designed to reflect operations and administrative support (logistics, personnel, and CAMG) in all prospective forms of war, including situations short of war. Friendly forces habitually reflect the presence of sister service and Allied units in deference to the ever-increasing joint and combined nature of warfare. Strategic settings portray conflict in which atomic weapons are used at varying levels of intensity and some in which there is only the threat of their employment. DLUAS subjects are presented in a worldwide range of locales, thus requiring the student to consider administrative support problems encountered in the rapidly established lines of communications as well as the problems posed for the more elaborate types of support. Likewise, the variations in tactical operations encountered in environmental change are presented. Future warfare is interwoven throughout the course. It is integrated into instruction as well as being reflected in a distinctly labeled subject.

Another essential College level control involves *phases* of instruction. Instruction is categorized in four general phases: Phase I—familiarization; Phase II—initial application; Phase III—advanced application; and, Phase IV—general military type educational subjects. With the complete rewrite of the 1958 course it was possible to realign the desired phasing. The control concept in phasing is that at least 40 percent of the curriculum consist of Phase III and IV subjects. Phasing must be reexamined for each curriculum year, otherwise shifts in emphasis and additions to courses of study invariably result in retention of Phase I and II subjects and curtailment of Phase III and IV. The flexibility inherent in the three-hour lesson[2] materially assists in readjustment of phasing.

In the DLUAS course the student is grounded in the fundamentals, capitalizing on the deliberate, thorough foundation obtained in his division level instruction previously given by other departments. He then progresses through an orderly

[2] *Ibid.*

transition of simple application to the more challenging, advanced problems encountered at the higher levels throughout the environmental variations already mentioned. These subjects are supported in turn by a carefully selected and scheduled guest speaker program.

A final consideration in the design of the DLUAS course of study is worthy of comment. How is adequate coverage of this broad area of responsibility best provided within the curriculum hours available? First of all, the combination of corps, field army, administrative support of larger units, and joint operations into a single cohesive course of study permits an integrated approach to instruction. This combination has eliminated much undesirable duplication and overlap. It has provided a consistent, coordinated, forward looking approach to both doctrine and instruction. The integration of author-instructors of larger units and administrative support subjects within DLUAS has facilitated subject coverage both in authorship and in the classroom. Another significant factor is that all division level applicatory instruction is presented within the framework of the corps and the field army. This is deliberately designed to make division level instruction more meaningful. Thus the DLUAS course is built upon the division level courses and becomes in fact the capstone of the College instructional pyramid. See Figure 3.

RELATIONSHIP OF
DEPARTMENT OF LARGER UNITS AND ADMINISTRATIVE SUPPORT (DLUAS)
TO OTHER COURSES OF STUDY

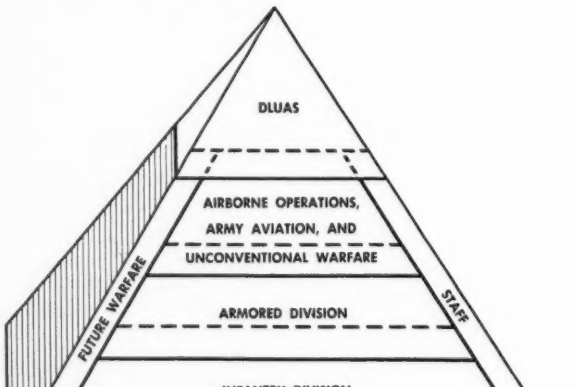


FIGURE 3.

Another contributing factor to the adequacy and effectiveness of the DLUAS course is the status of the student. By the

time he reaches the bulk of his DLUAS instruction, the student is more advanced than when he pursued his familiarization and fundamental instruction at division level. His response to the instructional purpose of the College and his intellectual growth are much in evidence. He naturally proceeds at a faster, more profitable pace.

The DLUAS organization has facilitated the realistic integration and logical portrayal of administrative support of large forces. With the logisticians and tacticians in the same department, writing and teaching their subjects concurrently, the logistical significance of military operations is ever present. Illustrative of this point is the subject on field army operations in a general war. Field army logistical instruction is integrated into the problem. This subject is immediately followed by an administrative support problem which reflects the complete establishment of a line of communications to support the field army. This approach to presentation of instruction is realistic, meaningful, logical, effective, and economical in terms of curriculum hours.

DLUAS makes maximum utilization of its curriculum hours by presenting a balanced, comprehensive sampling of military problems at its assigned level of responsibility in the most logical, realistic settings which can be designed. By continuous analysis of the course and by annual restoration of course balance which is achieved through adjustment in phases of instruction to take cognizance of new material introduced into the course, the reappraisal of locales and forms of war, shifts of emphasis responsive to doctrinal developments, and by critical evaluation of its end product, DLUAS instruction keeps pace with the future.

The foregoing discussion has related the DLUAS course of study to the College curriculum as a whole, and has set forth the approach by which the DLUAS course is designed. The next discussion treats the 1957-8 DLUAS course as to scope, content, and concepts. Refinements and improvements already planned for the 1958-9 academic year are reflected where appropriate and are so indicated.

Larger Units Instruction

The larger units instruction is concerned primarily with problems at corps and field army level. These echelons are the largest tactical command echelons within the purview of USA CGSC instruction. However, appropriate background of higher echelons of command is included to place the corps and field army instruction in proper perspective.

To provide the student a background for his division level studies, the larger units instruction includes early in the course general coverage on the Army in the field. The student is familiarized with the command structure from the commander in chief down to and including the division and major separate units in the field, with attention to the joint and combined aspects of military operations. The general functions and responsibilities at each echelon of command are covered. Any misconceptions that the corps and the field army are fixed organizations are dispelled early.

Colonel Hughes L. Ash attended North Georgia College (1932); completed the Advanced Course of The Infantry School (1948); and was graduated from the U. S. Army Command and General Staff College (1952) and the Naval War College (1956). During World War II he served in the European theater with the Services of Supply, Headquarters Command ETO-USA, and United Kingdom Base. He was battalion commander, 15th Infantry; commander of the 23d Infantry, and Deputy G1, Eighth Army, during the Korean conflict. Other assignments include duty with the Research and Development Division of the Department of the Army General Staff, and commander, Combat Command C, 3d Armored Division. He was assigned to the USA CGSC in June 1956 and now is with the Department of Larger Units and Administrative Support.

Following an interval during which the student receives basic staff and division level instruction from other departments of the College, the student progresses to detailed treatment of corps operations. At this time, realistic strategic settings in which corps-size forces are expected to operate are portrayed. These settings include corps offensive operations in a general atomic war, corps defensive operations in an atomic local war, and a two-sided corps map maneuver in a nonactive atomic local war which develops into an atomic local war. Geographical locales for these settings are western Europe, eastern Europe, and the Middle East.

Corps force structures are depicted as varying with the mission, characteristics of the area of operations, the enemy situation and capabilities, and the friendly forces available. The corps is frequently portrayed as an element of our strategic mobile ground force. Austerity of forces is the rule rather than the exception. Forces in being are dispersed and deployed on the battlefield consistent with a known or anticipated scale of use of nuclear weapons. Corps structures are often portrayed as combined commands with significant Allied representation and with due consideration of problems inherent in such organization.

Specific requirements facing the student corps commander or staff officer are the preparation of corps estimates and operations plans. Students select corps objectives, organize the corps for combat, allocate combat power (both troops and nuclear weapons) to subordinate units, and render command decisions based upon changes in the tactical and administrative situation. The student visualizes corps operations on frontages commensurate with the dictates of atomic warfare, applies mobile forces concepts of operation for his widely dispersed tactical elements, integrates organic and supporting weapons systems, plans the use of Army aviation, devises combat deception measures, and solves combat engineering and administrative support problems peculiar to corps level operations. Tailoring of forces and the use of nuclear weapons is stressed.

To complete the corps coverage, the student is presented an advanced applicatory problem involving an independent corps in a local nonactive atomic war. He also studies the administrative support of an independent corps in a situation short of war. The role of the corps in amphibious operations and airborne corps operations are included as subjects in joint operations instruction and the Department of Airborne and Army Aviation course of study respectively.

Having gained an appreciation of the field army as a result of division and corps instruction, the student is next introduced to the details of field army operations, both tactical and administrative, with emphasis on the differences in operations at these levels. The impact of adequate and efficient administrative support on the successful conduct of military operations at field army level is readily apparent.

With the divisions and the corps as the basic building blocks of the field army, the student studies the other combat, combat support, and administrative support units and activities involved in planning and conducting successful field army operations. He plans the field army troop requirements and tailors the forces to accomplish the army mission. The problems of large forces in the field under nuclear warfare conditions are approached realistically by designing the *minimum force* to accomplish the assigned mission. Planning includes the proper employment of nuclear weapons and the allocation of delivery means and weapons to properly influence tactical operations. The employment of missiles is stressed not only as the corps and army artillery, but also as Tactical Air Support to a certain extent, of the nuclear age.

At field army level the student army commander is taught the significance of proper administrative support of tactical operations. As the army G4, the student plans supply levels, and means and methods of distributing supplies to the users. He plans the integration of transportation (air and ground) to move personnel, supplies, and troops where needed. He locates administrative installations to provide adequate and timely support, and he plans the reestablishment of logistical support following enemy mass destruction attacks. As the army G1 he plans replacement support. As the army G5 he copes with the perplexing problem of the control of refugees and similar CAMG problems inherent in nuclear warfare.

Students, in the roles of army commanders and staff officers, make estimates and decisions, initiate operations, render command decisions at propitious times during the conduct of operations, and direct and redirect the combat and administrative support operations. The impact of signal communications on adequate and effective control of dispersed operations is stressed.

Operations which contribute to the field army's success in battle are discussed and planned. Such support includes barriers and denial operations, combat deception, psychological warfare, electronic warfare, and unconventional warfare. The roles of the Air Force and Navy are stressed in support of the field army. Orientation instruction is also given on their over-all mission.

The students examine the organization and missions of army missile commands. The three types of commands are covered as forces readily adapted to the nuclear-missile age warfare. Whereas this subject was integrated into a field army problem this year, for 1958-9 it will be a distinct subject with its own strategic setting to afford desired increase in coverage and emphasis.

Toward the end of the course, the student is divorced from the present and near future eras of military operations and is projected into the future, mid- and long-range periods. He visualizes and evaluates the feasibility and the nature of the conduct of larger unit operations. He develops ideas and concepts based on the contingencies of improved weapons systems, increased mobility, and reduced administrative support requirements. For 1958-9 this heretofore integrated coverage will be made a separate, distinct subject. In addition, of course, future concepts are thoroughly integrated throughout instruction in the entire course.

Throughout the larger units instruction, the student is reminded of the differences between the organization and operations of the divisions and corps, and between corps and field army. By solving major military problems at these levels in all forms of war and in a carefully balanced, realistic variety of operational environments, the student places larger unit operations into proper military focus. His continuous consideration of future trends and new concepts conditions his ready and intelligent acceptance of change induced by new developments, both in material and doctrine.

For 1958-9, corps and army instruction will reflect an additional increase in curriculum hours to afford a more comprehensive coverage of future warfare, missiles and missile commands, combat deception, and field army administrative support.

Instruction on Administrative Support of Larger Units

The administrative support of larger units instruction develops student appreciation and understanding of the administrative support within a theater of operations, exclusive of that support within divisions and the airborne corps. This instruction is primarily concerned with the

administrative support rendered in rear of the combat zone since the administrative support of a field army and its corps is integrated into the larger units instruction.

The term *administrative support* is a generic term encompassing the areas of logistics, personnel replacements and services, and civil affairs/military government. This term is used to include all areas of support other than combat support which is required for combat operations. The close interrelationship of these support areas requires their concurrent and mutually supporting treatment.

Early in the academic year the student reviews the historical evolution of administrative support in the US Army. He achieves an understanding of the scope, type, and sources of administrative support performed for major combat forces. This understanding provides adequate background for his division level administrative support. The instruction develops the broad administrative support structure of the theater administrative zone, to include its logistical commands, area commands, and the various functional administrative commands (civil affairs/military government, intersectional service, terminal, and replacement and training commands). The versatility of the logistical command as a control element for these administrative commands is stressed. Likewise, the role of the small general depot is covered.

Administrative support instruction progresses to a detailed analysis of supply, transportation, maintenance, construction, labor, medical evacuation and hospitalization, personnel replacements and services, and civil affairs/military government. The interrelationship of these various functions is examined from the command and general staff level. The role of each function in a large-scale administrative support system is emphasized. New technological developments and logistical concepts are introduced for student analysis and critique. Signal communications, including Automatic Data Processing System (ADPS), is considered in its specific application to an efficient administrative support system. The impact of Project *MASS*[3] and other progressive support procedures are emphasized.

In a series of exercises, the student participates in the planning and execution of large-scale administrative support from a command and general staff viewpoint. He isolates the problems related thereto in the areas of command and territorial organization, supply requirements and buildup, movement planning, troop requirements and allocations, employment and control of selected services, and the impact of the enemy nuclear capability on the administrative support system. He learns that execution is not only moving troops to required battlefields, but also maintaining them there. He learns that the administrative support system is tailored to the nature and type of warfare and to the size and mission of the force supported.

The student organizes and employs logistical commands as headquarters for major subordinate commands of the theater administrative zone. Incident to these applicatory exercises, the student prepares administrative estimates, plans and orders in a variety of situations. Base development planning is thoroughly covered.

The principles and techniques of furnishing logistical support for nuclear weapons systems in the theater is presented. This subject includes supply and maintenance of nuclear weapons and components, stockpile-to-user sequence, facility and transportation requirements, security, and the need for maximum integration of atomic and nonatomic logistics. Maintenance of weapons and delivery units, atomic basic load requirements, and

[3] "Project *MASS*—A Modern Army Supply System," Lieutenant Colonel J. C. Coleman, Jr., *Military Review*, July 1956.

engineer support to nuclear weapons delivery units are also covered. Whereas this instruction was integrated this year, it will be a separate and distinct subject for 1959 to afford better coverage and increased emphasis. Of course, this will be instruction in addition to that integrated in all appropriate units.

Techniques and principles for planning, organizing, and conducting rear area defense and area damage control are studied by the student in the "subcourse." He learns the requirement for detailed prior planning, centralized control requirements, the need for a single line of responsibility, the tasks to be performed, and the nature of decisions that must be made when the enemy attacks rear areas with nuclear weapons, ground forces, or both.

The administrative support of field armies by the theater army logistical command in a newly established theater is next presented. The student establishes the theater administrative zone, including base and advance areas, to support US and Allied armies. He develops target analyses of the administrative installations. Administrative support in future warfare is analyzed. The impact of the latest technological developments and concepts is presented, and electronic data processing is examined as a means of control of administrative support.

The problem of administrative support of a field army when a fixed line of communication exists is studied. Here the student is afforded a detailed look at the development of the existing administrative systems of the Army. The student next establishes the administrative support for a US corps and partial support for other US services and Allies in a situation short of war. This subject presents the many problems encountered in establishing a new line of communications, the difference in combat and near-combat replacement and consumption factors, troop basis planning, and use of offshore bases.

Finally, the student participates in a logistical command staff planning exercise in which a series of major problems, affecting the entire staff, are encountered. This exercise, conducted in a local atomic war setting, places the student's over-all grasp of administrative support in perspective, stresses teamwork, and emphasizes the decision-making process in administrative operations.

The U. S. Army Command and General Staff College as the Senior Tactical School of Combined *Arms and Services* thoroughly integrates into its instruction and imbues the student with the need for integrated tactics and logistics. He is regularly taught that administrative support functions must be oriented on and support the operational aspects of modern warfare. He thoroughly understands that no tactical planning is complete until he determines that our own forces, committed to the proposed course of action, can achieve the desired results because they can be supported logistically.

For 1958-59, administrative support instruction has been increased to afford additional coverage of logistical support of nuclear weapons delivery systems, permit a more initial orientation on large-scale administrative support, and afford more *advanced* application.

Instruction on Joint Operations

Closely allied to the discussion of larger units and the administrative support thereof is the organization and conduct of joint and combined operations. The joint operations "subcourse" is designed to accomplish the instruction in this area with particular emphasis on amphibious operations, air-ground operations, air defense, and Navy and Air Force contributions to operations of the army in the field.

All future military operations of any magnitude undoubtedly will be *joint* to a significant degree and probably will be combined with operations of other nations.

The student first examines the principles and considerations involved in the establishment, administration, and operation of joint, combined, and combined-joint commands. Specifically, this instruction deals with unified commands, joint task forces, and JCS specified commands, and the missions, principles of organization, and the conduct of operations of each.

As a basis for understanding the present and projecting into the future, the joint operations instruction includes the historical evolution of current air-ground procedures and agencies, capabilities and limitations, joint relationships with other services, and doctrine on air-ground operations.

Amphibious operations accord particular attention to the effect of nuclear weapons on such operations and the tactical and strategic implications of an amphibious capability. Multiservice support and the responsibilities of each service are studied. Complete and detailed consideration is given to support by naval gunfire, guided missiles, and air elements. Particular attention is devoted to the increased flexibility and reduced vulnerability that is inherent in the use of air vehicles (helicopters) in this type operation. An applicatory exercise includes complete tactical and administrative planning at division and corps level for the conduct of an amphibious operation. A concurrent and coordinated airborne assault is included.

Two distinct improvements in joint instruction are planned for 1958-59. The first is increased emphasis on air defense in the theater of operations; the problems involved and the means available for conducting air defense operations; the Army, Navy, and Air Force concepts of theater air defense; air defense organization, control agencies, and procedures; and future trends of air defense. The new unit of instruction will strengthen fundamental understanding of this significant problem.

A second major improvement in this area for 1958-59 includes comprehensive coverage of the specific problems of tactical control of military operations. Requirements for control agencies are discussed, particularly in view of new missiles and nuclear weapons effects on ground combat. The direction, control, and integration of these new weapons systems with Army aviation, Air Force support, air defense, and electronic warfare is mandatory. A special subject highlights the importance of electronic warfare in military operations. The Army Operations Center (TAOC), as an agency developed to coordinate army operations, is examined, and its capabilities and functioning are studied in the light of modern technological developments.

In this respect, General Willard G. Wyman, Commanding General, US Continental Army Command, recently stated:

> *Among its other advantages, our new joint doctrine will help us to implement the 'Army Operations Center'—a new concept which ties together in one coordinated agency all the means now available to assist the Army Commander to place his firepower and keep his maneuvering elements of Infantry and Armor where he wants them. It is a modernized version of the former Fire Support Coordination Center, but with Air Defense, Army Aviation, and Electronic Warfare added. This concept will be implemented both at Corps and Field Army levels under G3 supervision. Concurrently the old unwieldly Joint Operations Center is discarded and the Air Force will establish small mobile Air Support Operations Centers (ASOC's) to work with the Army.*

This new subject will replace the Tactical Support Center (TSC) concept which was covered by integrated instruction this year.

Development of Doctrine

As discussed in a previous article,[4] supervision of the development and revision of current doctrine and training literature is a staff responsibility of the Assistant to the Assistant Commandant for Doctrine (AAC/DOC) (Figure 1). Authority and the responsibility for the development of current doctrine, however, is decentralized to the instructional departments. A DLUAS Doctrinal Element coordinates such activities within the department.

By virtue of the organization of instructional departments along functional lines, the doctrinal fields of responsibility of DLUAS are coequal with the areas of instruction. These doctrinal fields of DLUAS represent a substantial segment of the present doctrinal effort of the College and include such representative areas as corps and army tactical and administrative operations, theater administrative zone activities, theater replacement support, rear area defense and area damage control, electronic warfare, barriers and denial operations, missiles and missile employment (corps, army, and army missile command), air-ground operations, amphibious operations, combat deception, air defense, and others of lesser magnitude.

The DLUAS doctrinal element supervises the preparation of a modern doctrinal basis for instruction in the department's area of responsibility as well as training literature for the Army in the field, and coordinates and correlates such doctrine throughout the College. The department takes the initiative to anticipate the requirement for doctrine, and to develop the doctrine concurrently with the development of weapons systems.

In view of the fact that actual experience (war) is not available to test new doctrine, doctrine must be developed on the basis of the probable and realistic roles and environments of the Army in the field. DLUAS, in its development of doctrine, taps many and varied sources to deliver its end product. The author-instructors initiate a significant portion of the doctrine. Much of their work in authoring new or in revising old units of instruction is devoted to research and study, which in turn is pointed toward new, pertinent material and new methods of application of doctrine. All units of instruction written by departments under College Guideline control are then carefully reviewed within the departments to ensure that doctrine is current and forward looking. This ensures that *all* doctrine is either DA or US CONARC approved or labeled as interior doctrine or new concepts as approved by US CONARC.

Students are a rich source of new thought and material. Each new course at the College brings new talent and up-to-date information on matériel, methods, and techniques in the field. Periodic Seminars are conducted between students and faculty for a free interchange of information and ideas for the development and improvement of doctrine.

Training literature serves as the medium of dissemination of doctrine to the field. DLUAS, like the other departments of the College, supervises the College training literature field which is allied to its instructional mission. Files are maintained of new doctrinal changes as well as of the new doctrinal ideas which must be projected into newly published Army literature. Doctrinal terminology is repeatedly reviewed to ensure that it is up to date and forward looking and that it does not convey archaic ideas and concepts. An intensified effort is made to modernize publications to keep the Army abreast of technological developments and tactical concepts and to stimulate the forward thinking of Army personnel.

DLUAS recognizes that modern and forward looking doctrine is required as

[4] "Keeping Pace With the Future—Development of Doctrine at USA CGSC," Colonel Victor W. Hobson, Jr., and Colonel Oliver G. Kinney, *Military Review*, November 1957.

the basis for progressive instruction in both operations and administrative support in the atomic-missile era. A major College effort is devoted to the development of improved logistical doctrine in keeping with new operational concepts. The functional College organization facilitates these efforts by assigning all logistical doctrine above division level to DLUAS. Likewise, division level doctrine is closely coordinated with DLUAS. Numerous improvements have been introduced into instruction on logistical techniques and procedures within the scope of the existing doctrine. Further improvements leading to more up-to-date instruction have been recommended by the College and currently are under consideration at Department of the Army level.

In contributing to the College mission of support of training, DLUAS monitors the College's annual participation in LOGEX. In LOGEX 58, as has been the case for the past several years, USA CGSC will provide six senior officers who will function as the Chief of Staff and Assistant Chiefs of Staff to the Chief Umpire. DLUAS also participates in the evaluation of training tests and contributes to other training support missions as required.

Summary

The DLUAS course of study is designed to present a balanced, comprehensive sampling of military problems at the larger units level. These problems are based on forward looking doctrine and concepts to cope with the ever-increasing complexity of projected warfare.

The DLUAS course deepens student intellectual development; assures his knowledge of his own service; facilitates his understanding of the ever-increasing combined and joint nature of warfare; and develops the necessary background to permit him to stay abreast of the rapid technological developments which have and will continue to complicate tremendously the waging of war. This course of study constantly requires the student to examine and reevaluate existing concepts of tactics and administrative support at its level.

The DLUAS course portrays the complete integration of tactics and logistics. It emphasizes the necessity that the Army be prepared to fight with or without atomic weapons, or with ground rules imposed on their employment. It depicts tactical and logistical operations in all forms of prospective warfare in a variety of logical operational environments.

The learning experiences encountered in the DLUAS course contribute substantially to the well-proven accolade—*Leavenworth is the springboard for the future intellectual growth of the dedicated military officer.*

MOVING?

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MILITARY NOTES AROUND THE WORLD

UNITED STATES

Project 'Far Side'

A giant plastic balloon is planned for use in Project *Far Side*, the Air Force's undertaking to fly an observation rocket around the moon. The polyethylene balloon, almost 30 stories high and large enough in diameter to cover two-thirds of a city block, will be used to carry the moon-circling rocket up above the major portion of the earth's atmosphere before the rocket is fired.—News item.

Battery in a Vest

A newly revealed battery, planned for Army field use, is designed to be worn as a vest. The flexible battery is built in two panels, each made up of a number of dry cells, and supplies power for a portable radio receiver and transmitter. It is said to work especially well in cold regions where a conventional battery's operating life is very short.—News item.

Pacific Rocket Range

The National Pacific Missile Range will extend for more than 5,000 miles into the Pacific Ocean from the rocket-launching site at Point Mugu, 33 miles northwest of Los Angeles. The first rocket tests are expected to be conducted on the Pacific range during 1958. One of the major services to be provided by the new installation is support of the ballistic missile training center at Camp Cooke (MR, Aug 1957, p 66). The Navy, which will operate the facility, now uses the islands of San Nicholas, Santa Rosa, Santa Cruz, and San Clemente off the California coast for tests of its existing family of short-range missiles.—News item.

Revolutionary VTOL Design

Designed to give maximum vertical lift through a vectored slipstream, a revolutionary VTOL aircraft is scheduled for

Artist's conception of VTOL aircraft

test flights in 1958. Planned performance characteristics of the new aircraft are not yet available.—Commercial release.

'Space Sentry' Radio

The *Space Sentry*, a giant radio transmitter with a 50-foot antenna, is used to bounce radio signals off the moon to permit the precise tuning of satellite *Minitrack* listening posts. The million and a

US Army Photograph
Space Sentry **antenna**

half watts of transmitter power of the radio is focused into a narrow beam by the dish-shape antenna which is based on the design of radar *Diana*, the first radar to make contact with the moon in 1946. The large transmitter operates on a frequency of 108 megacycles in the radio spectrum assigned to United States satellites, and bounces signals off the moon for five hours at a time. This not only permits the tuning of the *Minitrack* stations, but also is used for calibration by radio amateurs cooperating with the satellite effort.—Official release.

Solid Fuel Rockets

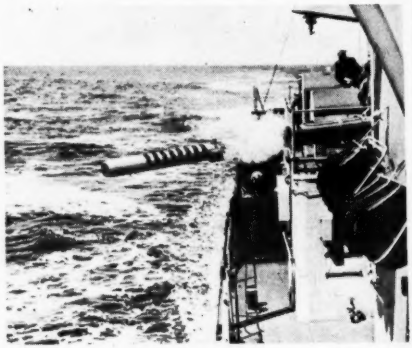
A solid fuel rocket, to be named the *Pershing*, is under development as a replacement for the Army's liquid fuel, surface-to-surface *Redstone* missile. The *Pershing* will be smaller, lighter, and more mobile than the 200-mile *Redstone*.

The Navy's solid fuel *Polaris* fleet ballistic missile has been test fired successfully. The two-stage *Polaris*, which utilizes a celestial-inertial guidance system, has a range of 1,500 miles. A land-based version of the *Polaris* currently is under study for the Air Force.

Major breakthroughs in the development of solid propellants now permit both thrust and directional control of missiles. Advantages of the solid over the liquid propellant include simplicity of manufacture and storage, and the fact that it can operate on a ready-to-fire status without expensive refueling.—News item.

Acoustic Torpedoes

Two lightweight acoustic-homing torpedoes, designated the *Mark 32* and *Mark 43*, are in service with the United States

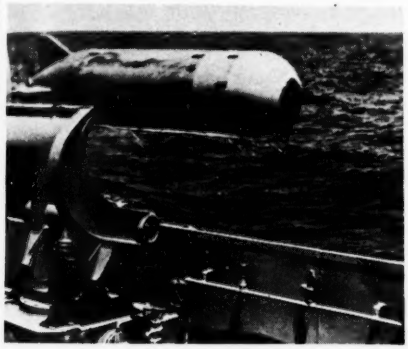


US Navy Photograph
Acoustic-homing torpedo *Mark 43*

Navy. The *Mark 43*, which can be launched by either surface ships or aircraft, is said to be a submersible guided missile that is capable of seeking out enemy targets at considerable depths. It is eight feet long, 10 inches in diameter, and weighs only

about one-eighth as much as the aerial torpedoes used in World War II.

The *Mark 32*, designed for ship-launching only, is said to be one of the simplest antisubmarine weapons the Navy has developed. It is carried on the deck of the launching vessel and fired by being tossed



US Navy Photograph

***Mark 32* torpedo in toss-launching**

overboard. When it hits the water, the acoustic-homing device and propelling motor are activated and carry it to its target at high speed. It has been announced that the *Mark 32* is obsolete. The Navy has revealed that a replacement weapon is being developed.—News item.

Tail Gunners Get TV

In the near future tail gunners of *B-52* bombers are to be moved forward near the rest of the crew, and sight their 50-caliber machineguns by closed-circuit television. The system will use two television cameras which constantly search the sky for enemy planes. The machineguns track the targets automatically and an electronic control system tells the gunners when to fire.—News item.

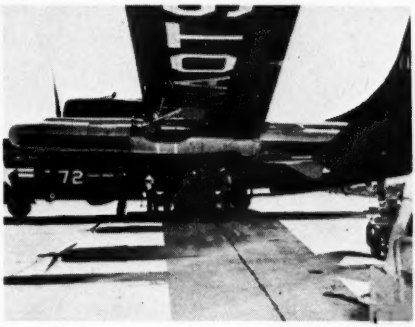
'Electra' in Military Versions

The United States first prop-jet airliner, the *Electra*, has been announced in five versions for military purposes. Military missions for the big four-engine aircraft include training in jamming enemy electronics, high-speed navigation training, personnel transport, medical evacuation, and light cargo transport. As a transport the *Electra* can carry from 66 to 91 passengers, and in the medical evacuation role can accommodate as many as 76 litter patients, along with necessary nurses and attendants.

The military versions are powered by four *T56A-7* prop-jet engines with a total of 16,200 horsepower. The *Electra* has a wingspan of 99 feet, a length of 104 feet, and a maximum takeoff gross weight of 113,000 pounds. It has a maximum speed of 450 miles an hour. Eleven world airlines have ordered 144 of these aircraft for commercial use.—Commercial source.

Flying Torpedo

The United States Navy's *Petrel* air-to-surface weapon, presently operational with the fleet, has been phased out of production. The *Petrel* is a winged torpedo



US Navy Photograph

***Petrel* winged torpedo**

that uses radar homing, discarding its wings when it goes underwater. It is 24 feet long and has a wingspan of 13 feet. The 3,800-pound *Petrel* is propelled by a *J-44* turbojet engine of 1,000 pounds thrust and attains a flying speed of Mach 0.7. It is carried and launched by patrol bombers.—News item.

Army Aviator Headgear

Army aviators are wearing Navy helmets in an interservice development of protective headgear for fliers. The installation of electronic components in an initial lot of 300 helmets is being accomplished under a Navy contract monitored by the Army Quartermaster Corps. Long-

US Army Photograph

Old and new type headgear

range development also is being conducted on an Army flying helmet which also will protect against shrapnel and small-arms fire by ground troops. Headgear previously worn by Army pilots has been a baseball type cap.—Official release.

'Regulus II' Production

An additional contract for over 26 million dollars has been awarded for the continued evaluation and production of the *Regulus II* guided missile. The big surface-to-surface weapon is destined to equip the Navy's first nuclear-powered missile submarine, the *Halibut*, now under construction. The *Regulus II* is 57 feet long, weighs 11 tons, and has a range in excess of 1,000 miles. It was designed for a speed of Mach 2, and is planned to replace the currently operational *Regulus I*.—News item.

Amphibious Helicopter

The *S-62* helicopter, which uses the rotor and transmission of the *S-55* helicopter, will have a flying boat hull and float fairings on the landing gear thereby eliminating the need for emergency floatation gear. The powerplant of the *S-62* is the *T58* free turbine engine. The craft will be able to carry a payload of one ton.—News item.

Air Rescue Helicopters

Production of *H-43A* and *H-43B* helicopters for the United States Air Force has begun. Initial deliveries will be the *H-43A* powered by 600-horsepower *R-1340* piston engines. Later deliveries will be the *H-43B* helicopter equipped with *T53* gas turbines.

The standard helicopter currently in use by air rescue squadrons of the Air Force

US Air Force Photograph

***H-19* air rescue helicopter**

is the *H-19*, a 12-seat utility aircraft. The *H-19* is used under the designation of *HO4S* by the United States Navy and Coast Guard, and is called the *HRS* by the

Marines for assault transport duties. It also is constructed under license in France and Great Britain. The British version, known as the *Westland Whirlwind,* is in service with the Royal Air Force and Navy.

United States Marines and the Japanese Air Self Defense Force have participated with the US Air Force personnel in water survival training in the Far East using the *H-19* helicopters.—News item.

Turbine-powered *H-43B* helicopter

Powerful Fuel

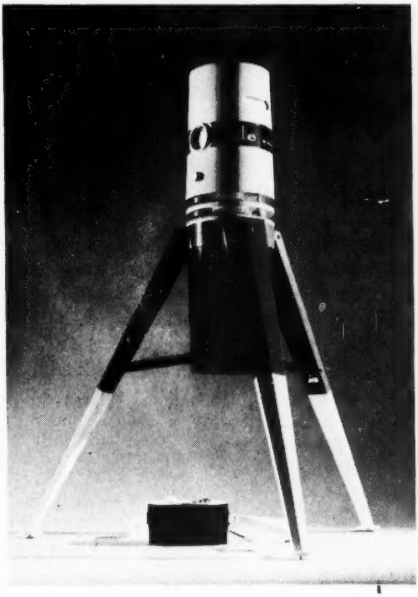
The fuel used in the first stage of the satellite-launching *Jupiter C* is said to have been Hidyne, a unique blend of two commercially available chemicals never before used at the high thrust level of rocket engines, according to the builders of the engine of the big rocket. The new fuel gave the first-stage rocket motor a thrust of 83,000 pounds, 12 percent above that developed with conventional fuel.—News item.

Food Irradiation

The preservation of food by controlled atomic irradiation is being conducted by Dugway Proving Ground in Utah, and over one hundred tons of food samples have been processed in the past three years of operation. Troop tests of the atomic-preserved food also have been conducted. According to a report, the gamma irradiation used has improved the storage qualities of many foods without introducing health hazards.—News item.

Gyrocompass

A transportable gyrocompass is in use in a direction-finding system known as ABLE (Autonetics Base Line Equipment) to determine true north automatically, accurately, and rapidly. The ground-based device operates in all weather, day or night. In using the system a standard transit is oriented with the gyrocompass, and is used to align missile launchers, mobile radars, and other equipment requiring exact orientation. The portable ABLE instrument weighs less than 70 pounds and can be assembled in 15 minutes.—Commercial source.



Transportable gyrocompass ABLE

GREAT BRITAIN

Engine Detuner

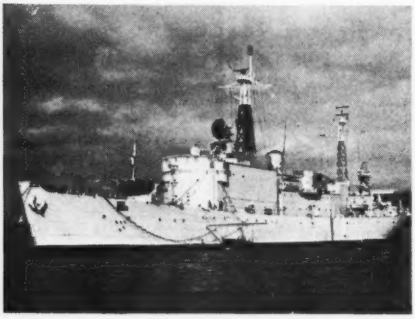
A water-cooled detuner is used in silencing the exhaust roar of the *Spectre*

Detuner silences *S-R.53* rocket roar

rockets of the *S-R.53* interceptor (MR, Sep 1957, p 69) in ground tests of the liquid propellant rocket powerplant. Water in the detuner is changed to steam by the heat of the exhaust in the process.—Official release.

Modernized Navy

The British Royal Navy now includes the experimental *Girdle Ness*, a guided



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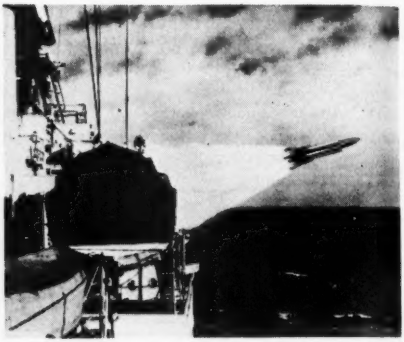
Guided weapons vessel *Girdle Ness*

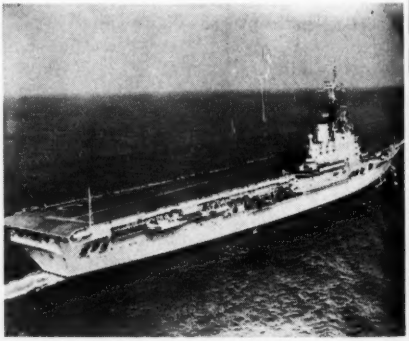
weapons trial ship which is armed with the surface-to-air *Seaslug* missile, three aircraft carriers of the *Centaur* class, and new antisubmarine and antiaircraft frigates.

The *Girdle Ness*, which displaces 10,200 tons and is 441 feet long, is equipped with a triple ramp for missile launching. Con-



Seaslug* launched by the *Girdle Ness

verted from a landing craft maintenance ship in 1956 the *Girdle Ness* has conducted many test firings of the *Seaslug*. The missiles are stored in a conventional



Aircraft carrier *Centaur*

manner in a deep magazine and conveyed to the launcher by an automatic hydraulic system.

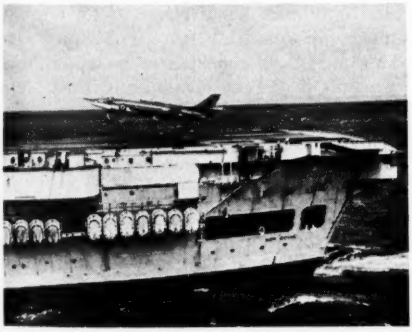
The *Seaslug* is a medium-range, ship-to-air weapon designed to engage enemy air-

craft which penetrate the fighter defenses of the fleet. It is 20 feet long and utilizes four boosters which bring it up to supersonic speed, after which the boosters are jettisoned and the missile is driven to its

Crown Copyright Reserved
Antisubmarine frigate *Torquay*

target by the sustainer motor of the rocket itself.

The *Centaur* class aircraft carriers displace 27,000 tons, carry 45 aircraft, and have made speeds of 29.5 knots on speed trials. These vessels have a modified an-



***Scimitar* in carrier landing**

gled flight deck. Originally equipped with hydraulic catapults, the *Centaur* has been provided with steam catapults.

The *Torquay*, first of eight planned *Whitby* class antisubmarine frigates, is designed especially to maintain a high speed in heavy seas during submarine search. Antisubmarine armament consists of two 3-barrel *Limbo* mortars, each of which can fire an accurate pattern of projectiles set to explode at predetermined depths. These vessels also carry two twin and eight single, 21-inch torpedo tubes. They are said to be equipped with the most modern underwater detection devices, and are capable of a speed of 30 knots.

The *Supermarine N.113 Scimitar* naval interceptor is in production for fleet use. The *Scimitar*, which is armed with four 30-mm guns and can carry air-to-air guided missiles, is powered by two turbojet engines and has completed exhaustive tests on the aircraft carrier *Ark Royal*. —News item.

Arms Plan Announced

A recent British white paper on defense has announced that nuclear weapons of megaton size are in production and deliveries to the Royal Air Force have begun. It was announced also that a ballistic rocket of more advanced design is being developed for launching from underground emplacements. According to the document, Great Britain will maintain forces of over 100,000 in strength in the Far East and Middle East areas. An all-purpose fleet of appreciable strength will be maintained in the area east of Suez and a number of frigates and other smaller vessels will be stationed in the Persian Gulf, Hong Kong, the West Indies, and the South Atlantic.

Research will continue on several naval projects, including a nuclear submarine. At the end of the current fiscal year the strength of the services is planned to be: Navy, 99,000; Army, 325,000; and Air Force 182,000. No change has been announced in the previously publicized plan to end national service by 1962, and to rely on smaller all-regular forces of a combined strength of 375,000 (MR, Sep 1957, p 70).—Official release.

JAPAN

Warship Construction

Four improved vessels of the *Harukaze* class frigates, construction of which was started in 1955, are scheduled for completion this year. The 1,700-ton warships are designed for a speed of 32 knots, and are armed with six 7.6-cm antiaircraft guns in dual mounts and two hedgehog depth charge launchers. Differing somewhat from the two vessels of this class now in service—the *Harukuze* and the *Yukikaze*—the new units are not of flush deck construction, but will have a higher superstructure and increased seaworthiness. Two of the warships of the 1956 program are in the last stage of construction. These vessels will displace 1,800 tons and will be armed with three 12.7-cm guns in single mounts and two 7.6-cm antiaircraft guns.—News item.

Quit Tokyo Field

The United States Air Force will move out of Tokyo's Haneda International Airport during 1958. American military transport aircraft will operate from the Tachikawa Airbase west of Tokyo. The move is being made to permit more room for commercial usage of the Haneda installation.—News item.

USSR

Supersonic 'Blowlamp'

Russia's light bomber *Blowlamp*, which can operate to altitudes of 52,000 feet and carry a two-ton payload, is reported to have a maximum speed of about Mach 1.5 with afterburning. Its two *MR-40* turbojet engines develop an estimated 17,100 pounds of thrust each with afterburners. The *Blowlamp*, which takes off with a maximum gross weight of 25 tons, has a twin-tandem landing gear, with smaller single wheels at each wingtip. It is 75 feet long and has a wingspan of 65 feet. The plane is equipped with two airbrakes that can be extended in flight, and its vertical stabilizer extends below the fuselage. The *Blowlamp* carries the Soviet designation of *IL-140* and is said to be planned as a replacement for the *IL-28 Beagle*.—News item.

Rocket Arsenal

The following is a compilation of currently available published reports on the weapons which make up the Soviet rocket arsenal.

The surface-to-surface *T-1*, originally designated the *M-101*, is a single-stage rocket developed from the German *V-2*. It is about 50 feet long and five feet in diameter. Propelled by a liquid rocket engine of 77,000 pounds thrust, it has an estimated range of about 300 miles and develops a top speed of 4,900 miles an hour. It is used by the Soviet Army, and is submarine launched by the Navy.

The two-stage *T-2* rocket uses a 275,000-pound thrust (approx) liquid rocket engine in its first stage, and a *T-1* rocket forms the second stage. This operational weapon, which is about 15 feet in diameter at its largest point and weighs from 80 to 95 tons at takeoff, has a range of 1,800 miles and a top speed of 10,000 miles an hour. This missile is reported to be at launching sites in Czechoslovakia and East Germany. About 2,000 of them have been constructed.

The *T-3*, formerly the *M-104*, is said to have been fired successfully over a range of 4,000 to 5,000 miles, and may be in production. It attains a maximum speed of 15,000 miles an hour and an altitude of about 900 miles. Its takeoff weight has been estimated at from 100 to 250 tons, and it utilizes a liquid rocket first stage with a thrust of about 800,000 pounds.

Solid fuel rockets in the surface-to-surface class are the *Comet I* and *II*. The *Comet I* is in mass production. It is designed for use by submarines, can be launched from under water, and has a range of 600 miles. The *Comet II* is a de-

velopment of the *Comet I* and also may be operated from submarines. It is about 50 feet long, and achieves a range of 700 miles and a speed of 6,000 miles an hour.

The *T-4* is a winged rocket now in production. A development of the *T-1*, it has a range of about 900 miles. It utilizes the same powerplant as the *T-1*, and can be controlled near the end of its flight due to its glide characteristics.

The *T-4A* is the designation of the Soviet's rocket "skip" plane. The last stage of this rocket is 68 feet long and uses three liquid rocket engines.

Air-breathing rockets are the *J-1*, a pulse-jet development of the German *V-1* with a range of 300 miles; the 700 mile-an-hour turbojet propelled *J-2*; and the supersonic ramjet-powered *J-3* with a range of from 1,500 to 1,800 miles. All three of these weapons are capable of being submarine launched.

The short-range, surface-to-surface *T-7A* is a simple design, single-stage weapon with an operational range of from 30 to 60 miles. This weapon is vertically launched, and is carried into battle on a tank-mounted launcher-carrier.

Another short-range support rocket is the *T-5B*, a weapon with a large nose section, large fins, and a considerably narrower motor tube.

Among the Soviet's ground-to-air missiles are the *M-1* and the *T-7* which approximate the US *Nike-Ajax* and *Nike-Hercules*, respectively, in range. These two missiles are said to be in use around Moscow and other key areas. The *M-3* ground-to-air missile is a two-stage rocket with a solid propellant booster.

The major Soviet launching area, at Kaspustin Yar, near Stalingrad, uses a test range which stretches 1,500 miles into the desert area northeast of Lake Balkash. Both ICBM and *Sputnik* vehicles have been tested from this site. The major portion of the impact area lies across Siberia, and a network of tracking stations have been established to track the test launchings.

The *T-1*, *M-3*, *T-5B*, and *T-7A* missiles are reported to have been displayed in a Moscow parade in November of last year (See "The Soviet Army Today," MR, Mar 1958, p 14).—News items.

Flying Motor

The Soviet's *Turbolet* flying motor is powered by a jet engine modified for vertical operation and uses jets of compressed air in place of the control surfaces of conventional aircraft. The flying motor is said to be quite maneuverable, and has passed initial flight tests successfully.—News item.

Solid Fuel for Aircraft

A new form of solid petroleum fuel that is transportable in open trucks has been announced. The fuel is formed into bricks which are covered with a protective film to prevent evaporation and mechanical damage. Before use, the solid fuel is treated by a regenerating plant which returns it to a conventional liquid form. The fuel bricks are said to be resistant to temperature and moisture, and can even be stored under water for a considerable period of time without damage.—News item.

ALASKA

Atomic Plant Planned

Plans for the construction of the Army's first operating field model nuclear powerplant have been announced. To be located at Fort Greely, Alaska, 60 miles south of Fairbanks, the plant will generate both electricity and heat for the military post —it will provide about 1,700 kilowatts of electricity. The reactor will be modeled after the prototype plant now in operation (MR, Jan 1957, p 67). Operating personnel for the powerplant are receiving training at Fort Belvoir, Virginia.—Official release.

SWEDEN

New Destroyers

Four destroyers of the *Ostergotland* class have been constructed for the Swedish Navy. Very similar to the *Halland* class destroyers (MR, Jun 1957, p 75) in appearance, the *Ostergotland* vessels displace 2,600 tons and are 380 feet long. They are armed with four 4.7-inch guns,

Destroyer *Ostergotland*

seven 40-mm antiaircraft weapons, six 21-inch torpedo tubes, and an antisubmarine triple-barrel depth charge mortar. Destroyers of this class have a top speed of 35 knots.—News item.

WEST GERMANY

Aircraft Engine Plans

The Bayrische Motorenwerke, manufacturer of the *BMW* engines which were used in many of the German Air Force combat planes in World War II, has received governmental permission to resume development and production of all types of aircraft engines.—News item.

AUSTRALIA

Joins Fleet

The *Queenborough* class antisubmarine frigate *Quiberon* has completed proving trials and has joined the Australian Navy. Three sister ships of the *Quiberon* are in commission, and four others are under construction. This class of warships displaces 2,700 tons and is designed for a speed of over 36 knots. Antisubmarine equipment consists of two multiple depth charge launchers. The four vessels under construction will have *Limbo* antisubmarine weapons and twelve 21-inch torpedo tubes.—News item.

FRANCE

New Use for Maginot Line

The underground chambers of the Maginot Line are undergoing renovation for possible NATO use. Water has been pumped out of the flooded chambers and the narrow gauge railroad is being repaired. The reoccupied installations will house units of combined staff organizations, including Americans and Germans. —News item.

'Atar' Engines

The *Atar 9* jet engine is ready for full-scale production. Flight tests of this powerplant have been conducted with the engine mounted under the belly of a four-engine *Armagnac* aircraft. Designed for

Etendard IV in climbing takeoff

aircraft which operate at supersonic speeds, the *Atar 9* is considered suitable for use up to the speed of Mach 2, and will be used in the *Mirage III A*, a delta-wing interceptor which achieved a speed of Mach 1.8 in tests last year. The *Atar 9* has a thrust of 12,000 pounds with afterburner. The version of this engine without the afterburner is identified as the *Atar 8*, and is currently in use in the *Etendard IV* interceptor.—News item.

FOREIGN MILITARY DIGESTS

Night Attacks

Digested by the MILITARY REVIEW from an article by
Lieutenant Colonel H. S. Yadav in "The Infantry Journal" (India) Nr. 2, 1956.

From the day he enlists, the soldier must be taught how to move in darkness. It is the only armor in which he can cloak himself.

FEAR of darkness is an inherent human trait. When the eye cannot see, the imagination takes hold and conjures up a thousand dangers lurking in the unknown darkness. This fear is aggravated in battle by the loss of direction and control. Consequently, operations in darkness have been undertaken with some reluctance by modern commanders. Frederick the Great had resolved never to attack by night and Napoleon had very little faith in night operations. Clausewitz, writing on war, considered that "a night attack also as a rule can only take place with secondary combats, and seldom with great battles," except when the enemy is so near "as to have him completely under our eyes, as the Austrians had Frederick the Great before the Battle of Hochkirch (1758)." For many years the unpopularity of night operations was transfixed by these pronouncements.

The Russians and Japanese believed differently. In 1794, under Field Marshal Aleksandr Suvorov, the Russians defeated a superior Polish force in a night attack near Warsaw, and in 1878 overwhelmed the Turkish fortification at Carso. The Russo-Japanese War saw much fighting at night. The Japanese studied the Russian methods and developed their own techniques to overcome Russian superiority in firepower. During World War II, night operations were a common feature of Russian and Japanese tactics.

In the west, however, operations in darkness, except for minor attacks and raids, were rare even during World War I. This was more surprising as the tremendous development in defensive fire, particularly of the machinegun, had made daylight attacks prohibitive. Yet, as Captain B. H. Liddell Hart explains:

Commanders were so obsessed with the risks of confusion that they habitually

chose the more certain risk of annihilation for their troops and stultification for their plans.

Nevertheless, the night attack by the Fourth Army on 14 July 1916, in the second phase of the Somme offensive, was strikingly successful despite many misgivings. The remarkable success of some of the other attacks during that war can be attributed to fog conditions which shrouded the attacker from the defender's aimed or observed fire. But mainly neither the British nor the Germans undertook many large-scale night attacks until World War II.

The lesson learned from World War I had proved conclusively the importance of night attacks. A British War Office committee appointed to investigate the lessons of the war reported that:

. . . as a result of our study we are impressed with the paramount importance of surprise both in attack and defense. . . . The conclusion is that movements by night may often be the only way of obtaining a tactical surprise, and attack by night the most economical way of crowning it by tactical victory.

World War II

However, there is no evidence to show that many commanders were entirely convinced by this report when World War II broke out, for night attacks were undertaken only with reluctance on a minor scale at first.

The first large-scale night attack was the El Alamein battle on 24 October 1942. In March of the following year the Eighth Army smashed its way through the Mareth Line mostly by night, and scored a great success. After the New Zealand Corps had broken through the defenses along the Djebel Melab Gap to the west of Mareth successfully, the 1st Armored Division followed through. It was pitch dark by the time the division had penetrated to a depth of 6,000 yards, but as soon as the moon came up the division continued its advance through the bottleneck and passed through the enemy, including the entire German 21st Panzer Division.

There are some other noteworthy examples of night attacks. The Sangro River was crossed at night. At Caen, the II Canadian Corps started Operation *Totalize* at 2330 on 7 August 1944, and had reached its objectives successfully four to five miles away by 0600 the next day. During the nights of 25 and 26 February 1945, the US 3d Infantry Division attacked along a 6,700-yard front with two regiments (brigades) abreast, and penetrated to a depth of 9,800 yards, capturing eight villages defended by German Panzer troops. The crossing of the Rhine and the establishment of the bridgehead was undertaken at night (2100, 23 March 1945). Many more examples could be quoted.

More recently in the war in Korea, night attacks were much in favor, especially with the Chinese. On 26 November 1950 the Chinese launched a violent and overwhelming night attack over a front of approximately 100 miles against II Corps of the Republic of Korea (ROK) Army. By the morning of the 27th the ROK Corps had practically been destroyed, despite a very determined stand.

Requirements

The development of artificial obstacles and firepower make modern defenses wellnigh impregnable. Without overwhelming superiority in firepower and absolute control of the air, a daylight attack, especially over open ground, has but the flimsiest chance of success. Even if the enemy defenses are pierced on a narrow front in daylight, the attacking forces will find it difficult to hold the objective in the face of an armored counterattack unless antitank weapons can be brought up in time. Without breaching the mine obstacle, these weapons cannot be brought forward; and,

unless aimed and observed fire can be eliminated, the breaching of the obstacle is a hazardous undertaking. On the other hand, conditions of darkness provide a cloak which can be used for avoiding aimed and observed fire for breaching the obstacle.

Then there is the important factor of surprise: "the more the attack partakes of the nature of surprise, the more successful we may expect to be," wrote Clausewitz. One of the surest means of achieving surprise is by attacking under the cover of darkness.

Furthermore, many successful daylight attacks have enabled the enemy to use the following night as a cover for escape. Had the attacks been at night in those situations, the enemy reaction would have set in at or near daylight, thus providing an excellent opportunity for the attacker's mobile element and air force to turn the withdrawal into a rout. This aspect in itself merits consideration more often than in the past.

Problems

The main problems of a night attack are fear of darkness, loss of direction, loss of control, difficulty of fire support, and confusion during reorganization.

Fear of darkness is both common and natural. Loss of direction and control have led to the doctrine of limited objectives in a night attack. However, defenses often are organized in depth, especially on ground of tactical importance. It follows, therefore, that the attack must be organized in depth and the momentum maintained if success is to be ensured without loss of time and manpower.

Fire Support

Fire and movement are the very basis of an attack. If movement has been stopped by fire, the attacker must bring down effective fire to neutralize the enemy weapons. Supporting fire can only be effective provided the target is located accurately. It is not easy to do this quickly at night.

The safety factor also comes into the picture, for it is extremely difficult to ascertain the actual location of the attacking troops during the battle. The supporting fire might hit friendly troops that may have made a deeper penetration in one place than those held up elsewhere.

There is also the question of fire support during reorganization. A fair margin of safety generally is allowed in the planning of defensive fire tasks. This margin, unless adjusted quickly, may allow the enemy to launch a counterattack without serious interference; also, if it has not been possible to capture the entire objective or direction has been lost, defensive fires must be adjusted accordingly. But such adjustment is difficult, takes time, and usually has to await daylight.

The fire support, therefore, is rigid. Consequently, the plan for the attack has no scope for flexibility and movement must conform to a rigid fire plan, unless there is scope for a silent attack.

Reorganization

The success of an attack depends not only in overrunning the enemy defenses but equally in holding the objective against the inevitable counterattack. In this the defender is at an advantage: he knows the area of ground; his counterattacks would have been rehearsed; and it would be comparatively easy for him to exercise control in the execution of his plans.

If an objective is to be held against a counterattack, the attacker must be able to take the following actions very soon after capturing that objective:

1. Resume control of the assaulting troops and post them along the approaches of the counterattack so that they can start digging in quickly.
2. Send out protective patrols.
3. Move up the reserve echelon.
4. Coordinate the defensive layout on the objective and adjust defensive fires.

5. Establish signal communications.

6. Bring up supplies including ammunition.

7. Move up and site machineguns, antitank guns, and tanks and coordinate their tasks.

8. Prepare for exploitation.

Loss of direction and control already have been emphasized. The rapidity with which troops can be organized to offer effective resistance to a counterattack is inversely affected by this loss. Furthermore, darkness makes it difficult to site weapons for most effective fire. The preparation of the defensive position takes time and serious disadvantages in weapons siting may be revealed at first light, necessitating adjustments and further loss of time.

It is not easy for patrols to operate effectively in darkness over ground which they have not seen in daylight. Friendly patrols may clash among themselves or be subject to their own defensive fire through mistaken identity or inaccuracies in adjustments. But patrols are an essential measure for security during reorganization.

Once the objective has been gained, the movement forward of the reserves is not a major problem; although the difficulty in the maintenance of direction and control are there. Darkness, however, is an impediment to the employment of reserves for such tasks as mopping up, which usually are accomplished in daylight.

Defense

To withstand a well-planned counterattack, the attacker must coordinate his defenses rapidly. The implication is the same as in the coordination of a normal defensive position, but with special emphasis on rapidity of execution. This is not easy in darkness when subunits may have lost direction and are scattered over the entire objective. A commander carrying out the coordination not only has to locate these subunits, but carry out such adjustments in dispositions and defensive fire as will ensure effective resistance.

The outcome of a defensive battle often has been decided by the state of signal communications. Even if the radio sets have survived the fighting for the objective, wire lines must be laid down to company and even platoon level, and messengers must know their way about on the ground. The establishment of signal communications over mines and boobytraps and in darkness has obvious hazards.

The preparation of the defensive position on the objective will require additional equipment and supplies which cannot be carried into battle by the assaulting troops. Ammunition must be brought up to replace the expenditure. These items must come forward without undue delay. However, their transportation across a mined area to the intended destination in darkness is no small problem.

Much the same applies to the movement forward of medium machineguns, antitank guns, and tanks. The medium machineguns will have to be manhandled as they must arrive on the objective soon after its capture. The antitank guns and the tanks, however, will await the clearance of a gap through the minefield. However, the siting and coordination must be done before first light; it is here that confusion so often results.

It is sometimes possible for the attacker to take advantage of the state of confusion on the battlefield when the enemy defenses have been overrun and he is thrown off balance. This is exploitation. Its success depends on quick action based on accurate information. Darkness, however, prevents the prompt and rapid acquisition of information.

These factors affect the rapidity and smoothness with which reorganization can be carried out. Unless troops are well-trained and planning is extremely thorough, snags will arise resulting in confusion.

Overcoming the Problems

Fear of darkness is the same as any other kind of fear. It is aggravated by anxiety and worry which are primarily attitudes of the mind. At the outset, therefore, the mind must be tuned to accept darkness as an invaluable cloak: it enables the attacker to close with the enemy in comparative safety and to destroy an opponent more easily; it is a friend and not the perpetrator of confusion.

It does not follow, however, that the hazards of a night attack should be minimized in training. On the contrary, it is vital that a true and realistic picture is presented to the trainee, but with emphasis on the great scope for success in a well-planned night attack. A few favorable examples from previous wars will help build up confidence.

A sure deterrent to fear is the soldier's ability to use his weapons and ground in battle at night with absolute confidence. It is here that the training goes wrong. Often, owing largely to inadequate allotment of time for night training, an attempt is made to carry out complicated maneuvers without mastering the basic drills and movements in which the troops might be extremely proficient by day. Thus in a single stroke, confidence is lost at the outset.

At first the training for night attacks must be devoted entirely to carrying out the normal daily routine in darkness. Then the handling and siting of weapons and the construction of defensive positions with obstacles should be attempted.

The second phase of training should be in tactical movements with special emphasis on maintaining direction and control. Here particular attention must be paid to "drills" which can be rehearsed by day first and then practiced at night.

The last phase should be in the nature of collective training. This phase can be introduced by carrying out all stages of the attack at night with previous rehearsals on the same ground as used during day practice. Each stage should then be practiced separately and drills perfected on another piece of ground, and finally, the complete attack should be practiced and progressively made difficult by the introduction of "phases" and limitation of physical ground reconnaissance.

In this way commanders and men will have developed confidence in their ability to attack successfully at night. They will know what to do in action and certain habits would have been formed which will be pillars of strength in battle. Thus fear will be replaced by confidence.

Direction

The Austrians succeeded at night against Frederick the Great in the Battle of Hochkirch because they had him "completely under their eyes." In other words, they were able to reconnoiter the ground thoroughly by day—this was a vital prerequisite. It rarely will be possible, however, to have the enemy defenses completely under our eyes. Nevertheless, air and ground photography, which did not exist in the days of Frederick the Great or Napoleon, can serve the purpose quite effectively, although it still must be used in close collaboration with ground reconnaissance. Aircraft, including the helicopter, also provide wonderful opportunities for valuable personal reconnaissance.

It is now possible, therefore, to build a very accurate model of the defenses to be attacked. Commanders and other key personnel also can see the area of ground from the air. These facilities must be exploited to the fullest in peacetime training.

A study of ground in this way can help considerably in the maintenance of direction at night. The objective can be demarcated and landmarks chosen. There are other useful aids which can be used in keeping direction. A few examples are given here:

1. Compass.

2. Tracers especially for giving general direction or marking boundaries between units. The Bofors gun, with its automatic fire, has been used effectively.

3. The moon and stars. There is a regrettable ignorance of elementary astral navigation in the army. Yet even a Boy Scout can make use of it.

4. Artillery and mortar fire. White phosphorous has been found especially useful in indicating objectives.

5. Lay of the ground. A slope, broken or rocky ground can, if previously studied, give very accurate indication.

6. Radio. This still needs development and research in producing a simple portable gadget which will indicate distance and direction from a fixed point. A suitable radio compass will help.

7. Use of artificial moonlight.

These aids are by no means exhaustive. Many more could be improvised. There is, for instance, no reason why subdued colored lights should not be used for marking a passage through the objective for the next phase or indicating the farthest line reached by the assaulting troops. This could also be used as a jumpoff line for the subsequent phase.

A practice which helps troops in keeping direction is to get them to patrol at night the area of ground over which they are to attack. It rarely will be possible for all troops to do so, but the junior commanders certainly should. The security aspect and fatigue of troops, however, must be borne in mind when resorting to this practice.

The maintenance of direction, based on the resources available today, is no longer an insuperable problem.

Control

This is largely a matter of keeping in touch with each other. The most convenient method of doing so is, of course, by radio; but in this there are two drawbacks: first, the radio operator or the instrument might become a casualty, which has happened often enough; second, the distribution of sets is limited—there are none below platoon.

How can these drawbacks be overcome? With the invention of the transistor it has become possible today to produce a radio set of incredibly small size. The time is not far off when every infantryman will carry a watch-size set as a basic issue; but there is no reason why the fairly small sets that exist today should not be issued to all officers and noncommissioned officers in a rifle company at once. This will guarantee a most reliable means of control during the assault.

Telephone lines should follow on the heels of the assaulting troops, and there should be very little delay in the establishment of wire communications between battalion headquarters and the companies after the objective has been overrun.

There are other methods too. In a noisy attack very effective use can be made of bugles, whistles, and shouting. In the conflict in Korea the Chinese were known to use all three.

Commandos and special raiding parties have used light signals to indicate a rendezvous while in contact. It is for consideration whether or not light signals judiciously used could be of help for similar purposes during the attack.

Special luminous markings also can be used for distinguishing commanders and key personnel, for example, luminous buttons. There is, of course, the much simpler form of using white patches and bands to serve the same purpose.

Therefore, the answer to the problem of loss of control in a night attack is not quite as difficult as it was in the days of Clausewitz.

Fire Support

It is easier to close in on the enemy at night without the same intimate and intense fire support that is required by day. In a few situations it may even be possible

to launch a "silent" attack; but a large-scale, deliberate attack will require a very carefully coordinated fire plan. This plan must be simple, and worked out in the closest collaboration with supporting arms; and, so far as possible, fire should be available on call.

"Fire on call" is somewhat of a bogy. It raises the question of inaccuracy and hazards, but it is not insurmountable. In a difficult situation it could be overcome by establishing a fire control post with the headquarters of each assaulting battalion. Here, based on the rearranged reports from the assaulting companies, the movement could be very accurately plotted, and the requests for fire support adjusted accordingly. The fire control post also would be of help in adjusting the defensive fires after the objective has been entirely or partially overrun. And, of course, the information plotted by it would be invaluable for ascertaining the position of the troops at any time during the attack with some accuracy.

Apart from artillery and mortars, armor too can be used to provide fire support at night. The ground and objective must, however, be suitable for this purpose. A few white phosphorous artillery shells on the objective can indicate the area to be engaged by armor. The morale value of this support is tremendous.

Reorganization Stage

It has been found from experience that successful reorganization depends largely on practiced battle drills, comprehensive planning and orders, and rehearsals. Here again an accurate model is of great help.

A common fault during training is to declare an attack successful as soon as the objective has been overrun. This should never be the case in an exercise on night attack. The reorganization stage must be completed. As darkness does not permit checking of battle drills and the process of reorganization, this could be done with very dark glasses worn by attacking troops during day practices. The faults can be detected by umpires while troops operate under simulated darkness. Later on, after practices at night, the completed reorganization must be checked for faults at dawn.

The plan must enable the assaulting troops to physically overrun all the enemy positions on the objective, thereby obviating the chances of leaving isolated enemy posts to interfere with the process of reorganization. Equally, the ground selected as the objective should facilitate reorganization at night. In the selection of the objective, air photographs often will play an important part. It is imperative, therefore, that all commanders down to noncommissioned officers are trained in the use of these photographs. The importance of this is obvious.

The success of a plan for night attack depends on detailed orders. Every man must know what he is required to do and what the situation is. The most effective method of ensuring this is by the commander issuing detailed orders, after which junior commanders brief their subunits on a model of the area to be attacked.

Rehearsal

Whenever possible the entire plan must be rehearsed. This is particularly applicable to the reorganization plan. Apart from ensuring a rapid and efficient execution of the plan, the rehearsal will show up weaknesses that can be rectified before the battle.

There is very little scope for the employment of reserves in an enveloping movement when the assault wave is held up. The main task of the reserve, therefore, will be to mop up, usually at first light, or to reinforce the assaulting troops during reorganization. Both these tasks must be planned and suitably rehearsed, especially the latter.

Thorough planning and rehearsals will pay a handsome dividend in coordination of

the defensive layout on the objective. Here, flares fired beyond the objective will provide sufficient light for some readjustments, especially in siting weapons. The approximate location of the troops can then be indicated to the fire control post, and defensive fire brought down and adjusted if need be.

If direction has not been lost and control is maintained, the establishment of signal communications should follow smoothly. The emphasis, however, must be on speed. This can be achieved by the line-laying party following behind the assaulting companies. On the objective itself, sections and platoons should contact their superior commanders as a matter of drill. In order to facilitate this procedure, the superior commander should transmit either light or sound prearranged signals to indicate his location to guide runners to him.

Supplies

Experience has shown that centralized control is the most reliable in moving up reorganization stores and ammunition to the objective. However, the articles to be carried forward, as also the mode of transportation, must be determined during the planning stage on a company basis.

It may be expedient to group the heavy machineguns with the reorganization supplies of the company in whose locality they are to be. This usually will prove to be the quickest way of getting them forward. The alternative is to send them up separately. Whatever the grouping, their location must be decided upon during the planning stage when provisional tasks must be allotted. The company commanders must know of the guns to be located with them. The orders must leave no doubt as to the details of movement and transportation.

The movement forward of antitank guns and tanks is slightly different. They will have to be grouped separately according to the gaps to be used and the destination. But here again planning and orders must be thorough: their location and tasks must be known to all concerned. The movement of tanks to a waiting area before going to the objective may need careful consideration of the surprise element.

As coordination of weapons and tanks is difficult in darkness, success will depend on the spadework done during planning. The details of siting should be worked out on a model and a sketch prepared from air photographs. Even so, snags will arise on arrival at the objective which can be ironed out in daylight only. The orders should, therefore, plan for readjustments at dawn.

The success of exploitation at night is almost entirely dependent on bold and aggressive patrolling. This is exactly what the Chinese did to achieve their remarkable successes at night in Korea. However, much will depend on intelligent anticipation and on the thoroughness in briefing the patrols before the attack. Also, plans must be on hand to send detachments with the utmost speed to seize any ground of tactical importance not held by the enemy.

If it has not been possible to exploit by night, an opportunity should be sought and seized at dawn the following day. Although reorganization involves taking up a defensive position on the objective, there is just no room for complacence. Offensive action *must* be taken whenever possible.

Conclusion

Whatever the nature of the conflict in which we might be involved, we must cultivate darkness as a powerful ally to add to our strength in attack. It may be fatal to wait for another war to teach us the obvious importance of night attacks.

There is no cause to take counsel of an exaggerated fear. With sound and imaginative training the difficulties in night attack can be overcome, given leadership with a high degree of professional skill.

Future War--That Great Unknown

Translated and digested by the MILITARY REVIEW from an article by Colonel B. E. M. Baron del Marmol in "L'Armée-La Nation" (Belgium) February 1957.

IN ALL ages the prognosis and preparation of future war, utilizing the advances of armament and technical modifications which occurred in the period of peace, has constituted one of the most difficult problems confronting military leaders.

The nuclear era which has just begun renders this problem still more arduous. Military literature of the moment denotes a great deal of fluctuation in thought and a jumble of extreme ideas.

To some, the nuclear weapon is only a new explosive—albeit more powerful. To others, it represents the possibility of advantageously replacing fleets of several thousand bombers by a single plane carrying a thermonuclear bomb. To still others, it is a weapon so terrible that its generalized employment would result in the extinction of all life on our planet. Finally, to still others the nuclear weapon, due to its power of destruction, constitutes an excellent protection against war.

All this is correct, in part, and I should like to make an analysis of this question and draw a few conclusions.

First of all, we are dealing with a new explosive obtained either by the fission (atomic explosive) of a heavy atom such as uranium, or by the fusion (thermonuclear explosive) of light atoms such as hydrogen.

The power of the atomic weapon varies from one to several hundred kilotons of classical explosive; that of the thermonuclear weapon is a megaton and reportedly has reached 20 to 40 megatons. The most powerful bombs at the end of World War II were of 10 to 20 tons of explosive, if we except the two atom bombs which gave the *coup de grâce* to Japan. This means that since 1945 we have augmented our possibilities of destruction by means of a single weapon in the same proportion as what had been achieved progressively since man has existed.

The military problem that this poses is entirely new. There has been no evolution but a veritable revolution. Hence one must be extremely careful in extrapolating the lessons of past wars to make predictions relative to future nuclear warfare.

Considering the ceaselessly increasing number of nuclear bombs in the United States and in the USSR, and the growing proportion of nuclear weapons which are becoming relatively easy to manufacture, we find ourselves facing an unheard of potential of an entirely different order than that of the weapons that have been at the disposal of the military chiefs.

To understand the evolution of military thought with respect to the nuclear weapon, one does well to consider the role thus far played by this weapon, particularly in the United States.

American Strategy

For several years now the American strategy has been based on the power of reprisal of nuclear weapons, fear of which is counted on for calming down the aggressive impulses of the Soviets. This is what the Americans call the deterrent power of these weapons. In truth, since 1945, American supremacy in the nuclear domain certainly has been an element of peace and equilibrium in the world. It has, perhaps, saved Western Europe from a Soviet invasion, and has compensated for the relative weakness of the Western Nations in the field of conventional forces without provoking an economic disequilibrium.

In 1955 the firm declarations of Presi-

dent Dwight Eisenhower on the subject of the employment of tactical atomic weapons for the defense of the island of Matsu, maintained a relative peace in the Taiwan region.

This is the past, and in addition, part of the present, and the immediate future.

But this role of a more or less absolute "deterrent" is real only to the degree that the aggressor is persuaded that the other party will reply by the use of nuclear weapons. Will this still be the case when the two adversaries have a more or less equal stock of such weapons at their disposal?

"Mutual Suicide"

At this moment the situation is undoubtedly such that any nuclear action will provoke an immediate reply of the same kind and there inevitably will result the stupid generalized nuclear war that Field Marshal Bernard Montgomery so rightly designated as "mutual suicide." To say nothing of the fact that, according to qualified scientists, this mutual suicide on the part of the two aggressors might not stop there but result in the disappearance of all human life on our planet.

In this connection I should like to quote a statement of Professor Albert Einstein's:

Behind walls of mystery are being perfected in-feverish haste, the means for collective destructions. If this aim is achieved, the poisoning of the atmosphere by radioactivity and, consequently, the destruction of all life on the earth, has entered the domain of technical possibilities. Everything seems to be enchained in this sinister course of events, each step seems to be the inevitable consequence of the one that has preceded it. At the end of the road appears more and more distinctly the specter of general annihilation. To turn aside this threat has become the most urgent problem of our times.

Obviously, we are facing a problem of extreme gravity which has given rise to violent controversies in certain military spheres—especially in the United States.

One question presents itself first: To what extent are the Soviets capable of obtaining fairly soon, a nuclear potential more or less equivalent to that of the Western World?

I do not believe I can do better than to give you the reply made by President Eisenhower when he was asked if he believed that in two or three years the Soviets could acquire a potential equal to that of the West. The President declared:

Any conclusion can be only speculative. For how long a time we shall be able to maintain our superiority is very problematical. There comes a moment when a certain superiority is not significant in the defense of a country. If you have enough of a certain type of weapons, I doubt that it is particularly important to have a great deal more. Therefore, I believe that there would be little wisdom in drawing a firm conclusion on the basis of the data now in our possession.

General Matthew Ridgway has stated:

Practically, equivalence of nuclear potential will exist when the Soviets are able to inflict with thermonuclear bombs, considerable damage on the sources of the military potential of the West. From this moment on, there is no further nuclear advantage.

Let us keep in mind the fact that nuclear power of destruction can attain a level where it is useless to increase it, and it seems that at least quantitatively the United States has reached this stage. Further, it is not necessary to have the same number of bombs as your adversary to annul his real nuclear advantage.

Besides—and this seems to be generally admitted—under the present conditions of science and industry, one cannot very well see what would prevent the Soviets from

catching up with the nuclear potential of the West in a few years.

We must adjust ourselves to the idea that the definite American superiority in the nuclear field will last only a certain length of time. At that moment the present strategy of the United States will have to undergo an evolution. This is the reasoned opinion of many distinguished Americans, one or two of which I should like to quote.

Some Opinions

On the subject of strategy, Adlai Stevenson declared:

If your military 'new look' means anything, I understand that if a new project such as Korea presented itself, you would react by nuclear bombardments on Moscow, Peiping, or any other place of your choice. This is the policy of threat of nuclear war which had some meaning when we had the monopoly of this weapon but, even then, it was not able to prevent the events in Korea or Indochina. But now our reprisals could only result in counterreprisals on the part of the Soviets and, in consequence, provoke the general war which you wish to avoid.

Again, Senator Stuart Symington, specialist in military matters, expressed the fear that a military force will be created which will not be able to defend the free world save by the use of a nuclear weapon which will bring about the destruction of the world.

General Ridgway, Chief of Staff of the American Ground Forces, on leaving his post, wrote a letter to his secretary, which was made public, in which he said:

In the nuclear armament race, the day is approaching in which the two great powers will possess a considerable potential. Reciprocal realization of the consequences of general nuclear war may very easily result in the decision not to employ these weapons in view of the mutual disaster that would result from it. Faced with the West's preponderance of nuclear armament, it seems doubtful that the Soviets would take the initiative of employing nuclear weapons.

On the other hand, if the Western Powers took this initiative, the Soviets could not but reply and the destruction that could be counted on would limit the possibilities of the United States being able to effectively continue such a war. In view of this possibility of prime importance, one at least wonders whether the United States can permit herself to count mainly on nuclear weapons as the basis of her military potential.

Tactical Weapons

Attention has been called to the fact that the circumstances of possessing an enormous reprisal potential would not imply that one had the intention of employing it under all circumstances; recently, emphasis has been placed on the tactical nuclear weapon. The fact that the United States feels herself more and more vulnerable to Soviet strategic nuclear actions perhaps has diminished the enthusiasm of certain Americans toward the employment of these weapons. Hence there is a tendency, at the present time, to be willing to content themselves with tactical nuclear weapons, just to a sufficient extent, they say, to ensure the success of our camp.

This appears relatively seducive as long as we are the only ones to have these tactical nuclear weapons at our disposal. But when they exist in the other camp, they also will desire to employ them just to a sufficient extent to ensure victory and, little by little the general nuclear war will be unleashed.

This is the truer since the inhabited places, the large industrial centers, and ports constitute objectives particularly vulnerable to the powerful thermonuclear weapons, while the employment of these giants against dispersed military objectives is of but mediocre effectiveness. Is it

not reasonable to think that the equivalent nuclear potentials will neutralize one another? When the effects of the nuclear weapon are better known, is it not probable that, at the moment when a certain nuclear balance is reached, a formidable pressure resulting from a powerful instinct of self-preservation on the part of the peoples will make itself felt from all sides to prevent the employment of these weapons?

However, it is nonetheless true that a very large and dispersed nuclear potential continues to be an absolute necessity for the West for preventing the adversary from employing his nuclear weapons. All things considered, this potential will be a good "deterrent" against nuclear war but no longer against a nonnuclear aggression.

Equilibrium

In the Western camp the importance of the nuclear factor often has been insisted on for compensating for the superiority of the Communist camp in point of numbers and conventional armament, but it is quite evident that the argument loses all of its force if nuclear equilibrium gives the Soviets, practically, an over-all relationship of forces that would be favorable to them.

In reality, renunciation of a certain degree of equilibrium in the nonnuclear domain, and reliance on nuclear supremacy which can only decrease would, on the part of the Western World, be a kind of defeatism. It would almost amount to playing a losing game. In any case, it would be taking a great risk with respect to the future.

Naturally it is not easy to persuade an aviator who is enthusiastic over the enormous potential of his new weapons that he might not have to use them. This, he would tell you, is contrary to all the lessons of history. It is not easy, either, to obtain agreement on the part of our public opinion, that a major effort is necessary in the nonnuclear field when the idea is expressed that nuclear weapons could prevent war or permit winning it in a few days.

Let us not forget that mutual destruction does not constitute an objective of war, and that a generalized nuclear conflict cannot be profitable for either of the two parties.

We come back, therefore, to the opinion that there soon will come a time when it will be unreasonable to unleash nuclear war—this brings us to the possibility of a nonnuclear conflict. To render this possible it is necessary that our military apparatus, our methods, and our organizations not be so invaded and conditioned by nuclear weapons that we can hardly fight without them. We would risk being drawn into generalized nuclear war in spite of ourselves.

We could summarize the conclusions which we have reached as follows:

1. A large nuclear potential is a vital necessity to the West to prevent its adversary from employing nuclear weapons.
2. Nuclear weapons no longer constitute an absolute "deterrent" when the potential of these weapons is more or less balanced between the possible belligerents.
3. It is not certain that these weapons will be employed, even in a major conflict.
4. Nonnuclear forces still retain their importance and it is well to see to it that they are capable of being employed, if occasion arises, without the support of atomic weapons.

Admitting these conclusions, it remains for us to determine the kind of war we must look forward to and prepare for on this basis.

No War

Obviously, this is the happy solution. Perhaps the existence of the sword of Damocles, constituted by the nuclear weapon, hanging over the world will incite humanity to regulate its differences in a peaceful manner and employ the enormous sources of energy, which human science

aster that would result from it. Faced with tives is of but mediocre effectiveness. Is it

has succeeded in developing, for its general welfare.

It is, moreover, not impossible that the Soviet world will undergo an evolution that will bring it closer to the Western World and render a world conflict less probable.

This point has not been reached, however, and to any serious observer the continual development of the Soviet military apparatus corresponds to a very clear will to dominate, but does not necessarily mean war. Within a few years, this military potential probably will have risen to such a degree that it will naturally lead to diplomatic pressure and, perhaps, to an armed conflict. Only a serious disarmament agreement or some internal breakdown in the Communist world can really reduce this threat.

Western Nuclear Supremacy

This lead on the part of the Western World has already, for practical purposes, been overtaken. Although, a few years ago, some in the Western camp believed they saw the possibility of taking advantage of massive supremacy for crushing the Soviet potential under strategic nuclear bombardments, the present relationship of nuclear forces no longer authorizes such illusions.

Furthermore the Western World's desire for peace thrusts aside all ideas of preventive war. On the other hand there is but small likelihood that the Soviets will risk unleashing a world conflict until they have attained a certain nuclear balance.

Therefore, it seems that war in which the West has nuclear supremacy is becoming less and less probable, and that we should not devote all our means and efforts preparing for it.

All-Out War

All-out war is the unprecedented catastrophe of which we were just speaking.

We must prepare for this kind of war carefully, for we must be ready for the worst and, even if we are determined not to take the initiative in this domain, we must be capable of reacting efficaciously against any act, as insane as it may be, of an eventual adversary.

This involves a considerable effort of development and adaptation on the part of our armed forces. Development and dispersion of nuclear weapons and their launching means, detailed preparation of their employment, and protection of launching sites constitute the principal part of the problem.

Many consider that a conflict of this type would be very short and that the principal role would be played by aviation and special devices for delivering atomic weapons. It is nonetheless true that even if the protection of naval convoys in a short nuclear war may be regarded as of secondary importance, the protection of ground forces is a vital necessity for the friendly countries close to the enemy threat.

On the other hand, is it certain that the conflict would be short? After the initial, concentrated nuclear exchange, the nonnuclear forces perhaps will still have their role to play whatever the degree of their disorganization.

The tactics of dispersion and mobility which are basic in nuclear war require troops of the highest quality, well-trained, and, above all strongly officered. Numerous units of the combat team and paratroop type belong in this framework. These qualities are no different from those that have always been required of very good forces. To this must be added special training in protection against nuclear weapons and in their employment and exploitation, including advanced training in the search for information which has become a major factor for the effective employment of atomic weapons.

It is, therefore, on the interior front that nuclear war must be prepared for in order to reduce, to a certain extent, not only its enormous losses but, especially,

the psychological shock the use of these weapons will inevitably produce. It is not only in the military domain that the highest order of leaders will be needed to restore order in the chaos produced by the nuclear weapon.

I should like to call attention again to the fact that, for the reasons given, we may consider this type of war unlikely; and the less likely, the better one is prepared for it.

Nonnuclear War

At the risk of appearing "behind the times" to the enthusiastic partisans of the nuclear weapon, I believe that this type of conflict is a possibility—that it is, all things considered, preferable to the preceding solution and that we must prepare ourselves seriously for it.

I must confess that, if we imagine ourselves in 1960 or 1962, I cannot conceive the West reacting with nuclear war to an attack on Narvik or Salonika, or even to an attack on Berlin. But a conflict of this kind, perhaps limited at its beginning, may develop rapidly if we do not have the means for reacting with an adequate nonnuclear potential.

Indeed, we must recognize that we are on delicate ground, for in certain Western circles it appears to have become dogmatic that, on the basis of so-called conventional forces, the supremacy of the Communist world is certain and practically definitive. This is questionable because it is not proper to reason only on the basis of numbers of divisions and thousands of planes. Even leaving extra military elements out of the question, numerous factors such as quality of armament and personnel, control of the seas, mobility of forces, distribution of bases, and logistical limitations must be considered.

How Must We Prepare?

Must we really acknowledge ourselves conquered in advance, or are we obliged to resort to mutual suicide? This, in fact, is the dilemma which faces us if we do not have the courage progressively to take the steps required for being militarily prepared on a nonnuclear basis.

This will involve a large effort on the part of our countries. Since we will no longer be able to count on the concentrated nuclear action of aviation and because of the advancements in ground-air, radio-controlled missiles, the role of the air arm could be less decisive than some imagine; sufficient, high-quality, very mobile covering forces will be necessary. It will be necessary to prepare the mobilization of large reserve forces in a timely manner. It also will be necessary to keep our sea-lanes open, and we must prepare to develop our war industries in time.

All this may resemble the preparations for the preceding war. In reality, besides nuclear weapons, many modifications and improvements have been made in our armed forces, especially in the electronic field. In any case, future war would be very different from the preceding one.

For all this, it is nonetheless true that it probably will be necessary to prepare to wage a long and trying war. However, is it not preferable for humanity to suffer for a few months, even years, than to die in a few days?

Here, again, our ability to avoid a catastrophic conflict can be measured by the effort we make to withstand Soviet domination.

Cold War

This type of conflict seems to be much in vogue at the present moment, and everything seems to indicate that it will continue to develop.

For the Western World this type of war, based on revolutionary actions, subversive propaganda, and other means in which the Soviets are past masters and which has already brought them considerable successes, is perhaps the most difficult to conduct to a successful issue.

It also requires many different prepara-

tions in which the military element, properly speaking, has only a small part. Our civilized countries have, undeniably, a tendency to seek easy solutions. We fear risk and hard conditions of existence. We enjoy the present but are not ready to fight for the future and, above all, we too often lack an ideology and a faith without which nothing great is accomplished in the world. Therefore, it is in the domain of education that serious work should be done to improve our populations in this domain.

This moral factor has, furthermore, dominated the military problem in all ages and, as General Eisenhower very truthfully indicated in a speech at the time of his departure from the Command of the European Forces, let us not forget that in an examination of the relationship of forces, morale is a factor, and that if this factor is nil or very weak, the ensemble of the forces, whatever they may be, no longer represents very much.

As can be seen, the problems now facing the military are far from easy. The nuclear weapon which for a few years simplified the problem, will henceforth only render it more complex, more burdensome, and more dangerous.

It is a fact that has to be accepted and, in the greater power placed at our disposal, we must, above all, see the possibility of employing this power for spreading throughout the world better conditions of existence which will perhaps reduce this morbid tendency toward fratricidal conflicts.

How Clear Is My Crystal?

Digested by the MILITARY REVIEW from a copyrighted article by Major N. B. M. Smithson in "The Journal of the Royal Artillery" (Great Britain) July 1957.

IT IS difficult in our present stage of development to foresee the probable nature and design of an all-out nuclear conflict. Ideas vary from the "science fiction" pushbutton war of nuclear missiles, in which ground forces are not even considered, to the diehard beliefs of those who maintain that nuclear weapons are just bombs and shells of bigger capacity and greater destructive power. Somewhere between lies the answer; an answer which, at this stage, probably can be only a guess—a guess which should, however, be based on the best available evidence. At present this is a compound of the knowledge of the scientist, the psychologist, the historian, and the practical military thinker.

To build up a reasonable background we must make a number of assumptions and consider the probable effects of certain important factors. From these it should be possible to deduce an organization and the broad scale and nature of the probable weapons to be used by such an organization. Finally, we will consult the crystal in order to outline the tactics that such an army of the future might use.

Assumptions

The first and most important assumption is that, despite the "Wellsian" fantasies of some of our science fiction writers, men will still meet men in combat on the ground. Others are that:

1. Nuclear bombardment will cause immense destruction to communications, storage areas, towns, cities, and ports.

2. Ground troops, probably air transported on both sides, will be fighting to some extent in isolation of the continuing intercontinental nuclear exchange. They will have objectives and tasks which they will endeavor to achieve irrespective of

the apparent outcome of other battles.

3. General information will be sporadic and inaccurate, a mass of lies and propaganda. The only thing on which it will be possible to rely will be the properly authenticated orders and reports of the fighting commanders.

4. The kind of tasks the ground forces might be called upon to undertake could be:

a. Assaults against enemy-guided weapon launching sites, airfield complexes, nuclear storage areas, industrial areas, and sources of national industrial power.

b. Defense and protection of similar target areas in our possession.

Certain factors will have more influence than others on organization and equipment. It is suggested that the following are the most relevant:

1. *Thermonuclear destruction and contamination.*—This will have a major effect on communications and will make some form of air transport mandatory. The air probably will be the only medium in which large-scale physical movement will be practicable.

2. *The use of tactical nuclear weapons by ground forces.*—These will complicate the land battle and require a proper balance between conventional and nuclear weapons. An organization and technique will be required which will enable our forces to defeat the enemy and, at the same time, avoid becoming a worthwhile target for enemy nuclear weapons.

Destruction and Contamination

Most authorities agree with the broad picture of thermonuclear hostilities; a period of unrestricted attack and retaliation involving all the main centers of population, industry, and communications. During this phase normal surface movements well may be brought to a standstill. Movement by personnel on foot or by some form of tracked amphibian might be possible, but the organized movement of military formations and supply convoys, as we at present understand it, would be out of the question.

The problem of movement and supply becomes, therefore, a problem in air transportation. Helicopters and aircraft capable of very short takeoff and landing runs like the *Beverley* (MR, Nov 1956, p 79) seem at first to be the best answer. They suffer, however, from disadvantages which might make their use an unacceptable hazard. They are relatively slow and vulnerable to any form of antiaircraft defense.

There will be many tasks for aircraft of this type, but for the major tasks of large-scale movement and supply they are not suitable. Whatever the aircraft used, the only practical method of delivery will be vertical whether by parachute or air landing. It also appears that certain weapons that we have grown used to seeing on the battlefield will no longer be capable of use in this form of war. The tank in its present form, the self-propelled artillery weapon, the heavy field gun, and the antiaircraft gun, to name a few, must change in size and weight to a considerable degree before they can be accepted.

Nuclear Weapons

The main effects of tactical and nuclear weapons likely are to be organizational. Each side will have to avoid providing the other with a worthwhile tactical nuclear target. Such targets might be: headquarters of formations down to and including brigades, concentrations of personnel, vehicles or equipment at a high density, and tactical nuclear weapons sites.

Large dispersion of headquarters of the present type, to avoid making a target or to minimize casualties, is one answer to this problem, but not, it is suggested, the best. Through the years staffs have increased steadily in size, not in proportion to any increase in strength of fighting troops, but as a result of administrative considerations. What is required is a new command concept which will reduce staffs

to such proportions that there is no fear of their being either a worthwhile or, what is more important, an identifiable target.

The commander with an operational staff should control the battle. The various staff advisors must be readily available but not necessarily organic to the headquarters. They could well be the commanders of the various support units. The intelligence element must function on different lines than at present. Technical ingenuity must be used to provide the commander with enemy location and strength without extra staff personnel. The administrative and supply services must be operated on a more mechanical basis. This may be uneconomical in material and may involve greater risks than in the past; however, these must be accepted.

Combat actions are unlikely to be protracted—either they will succeed quickly or fail. Any tendency for operations to become static or confined geographically will invite the use of thermonuclear weapons. *This can, and most probably will, remove the tactical battle from the map.*

The size of any particular force can be determined only by the scale of operations envisaged. Bearing in mind the nature of movement and the methods of supply and maintenance that will be available, the kind of operation that is considered feasible would be one involving between five and 10,000 fighting troops in an assault. This would be against some specific target probably defended by enemy ground troops. It is to be expected that the task can be completed in a matter of days and that the force then would be withdrawn. The operation would be planned at one of our bases by special planning staffs and the necessary force earmarked.

Organization

Infantry, that is, men on their feet capable of maximum agility would be required in any type of ground operation. Only they can perform the physical tasks of occupation, detailed destruction, or investigation that may be required. In addition, a number of other arms are required to enable the infantry to perform its tasks.

This leads to a requirement for two forms of basic unit—infantry assault, and support.

It is realized that nuclear war would impose strains on morale far in excess of those experienced in the past. In addition, the techniques of "indoctrination" and "brain washing" adopted by the Communist powers show that nuclear effects are not the only new factors that will have to be reckoned with.

It is important that the "dispersion" and "smaller unit" concepts required for the avoidance of nuclear casualties should not allow any lowering in the basic regimental *esprit de corps* which has been the bulwark of morale and discipline in the past. It is essential that the regiment should remain the basic unit in peacetime, but it is probable that during hostilities it may prove too large an organization for the nuclear land battle, and may have to be broken down into a number of smaller units. These we will call assault companies.

Infantry Assault Companies

The aim is to create a unit that is large enough to do a task and which is, at the same time, the maximum that can be accepted as a total loss to any one tactical nuclear attack. Such a unit must be capable of direct command by one man. It must contain all the weapons necessary for its own defense, but it will require support for sustained offensive operations. It should be self-contained for short periods of operation; supply and maintenance will be by air and the unit must be capable of improvising collection and distribution facilities as and when required. No element in the operational unit should be included for administrative purposes. The unit should be divided into a number

of subunits (platoons) and these in turn into sections. The sections should consist of about 10 men including a leader. The armament requirements of the infantry should be met by two basic items:

1. A multipurpose automatic rifle-submachinegun.

2. A weapon capable of discharging a high-explosive, antipersonnel shell and some form of antitank missile—the former on a high trajectory to a range of 3,000 to 4,000 yards, the latter on a flat trajectory to a range of 500 to 900 yards.

All troops must be mounted and, as far as possible, one basic vehicle should be provided. This should be an amphibious tracked carrier with a low silhouette capable of carrying approximately 10 men. It should be capable of adaptation to take the high-explosive antitank missile launcher. It must, of course, be air transportable.

Figure 1 shows the possible layout of a peacetime regiment consisting of a number of operational units. Figure 2 shows an infantry assault company.

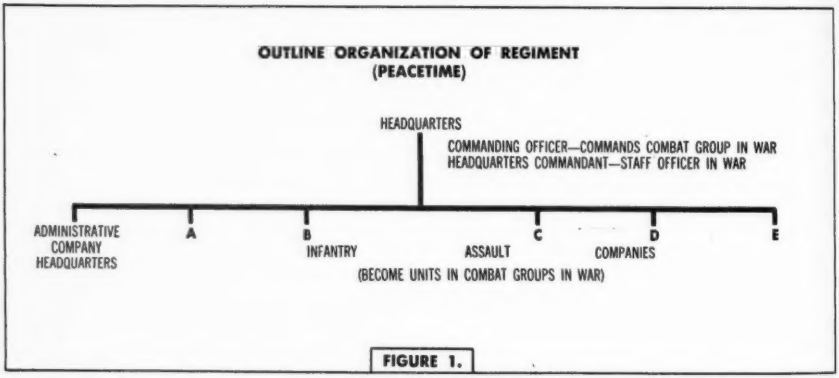


FIGURE 1.

Support Units

The infantry assault companies will be mobile and capable of limited defense, but for attacks against prepared enemy positions nuclear fire support is essential and antiaircraft defense and engineer assault assistance also may be necessary. For these tasks the types of support unit required would be nuclear, antiaircraft missile defense, and engineer assault.

Although they may not be as mobile as the infantry these units must have a high degree of mobility. The amphibious carrier of the infantry assault companies should be used for most purposes, although special self-propelled mounts may be required for the technical equipment of these units. Everything must be air transportable. Like the infantry, peacetime regiments will consist of one or the other type of unit, but not a mixture. Units will break down into subunits and sections on a scale that would enable proper integration of their weapons within a balanced force.

Equipment requirements for these units would be basically:

1. *Nuclear Support Battery.*—A self-propelled, surface-to-surface, nuclear weapon system with a missile of a range capability varying from five to 50 miles. The yield of the missiles should be capable of variation over a considerable range.

2. *Antiaircraft Missile Defense Battery.*—A self-propelled, surface-to-air weapon system with missiles capable of destroying an enemy aircraft or surface-to-surface missile over a range of up to 50 miles and up to the maximum possible height.

3. *Engineer Assault Assistance Squad-*

ron.—Self-propelled constructional and earth-moving machinery; demolition, mine-laying, and obstructional equipment.

There will be units other than those outlined; Signal, Electrical and Mechanical Engineers, Army Ordnance Corps, and Army Service Corps to name a few. However, it is considered that these will be peacetime and base units, and that their use of outside bases on operations of the type under discussion would be treated as a special case. Their composition and tasks would be dealt with during the preparation of the joint operational-administrative plan.

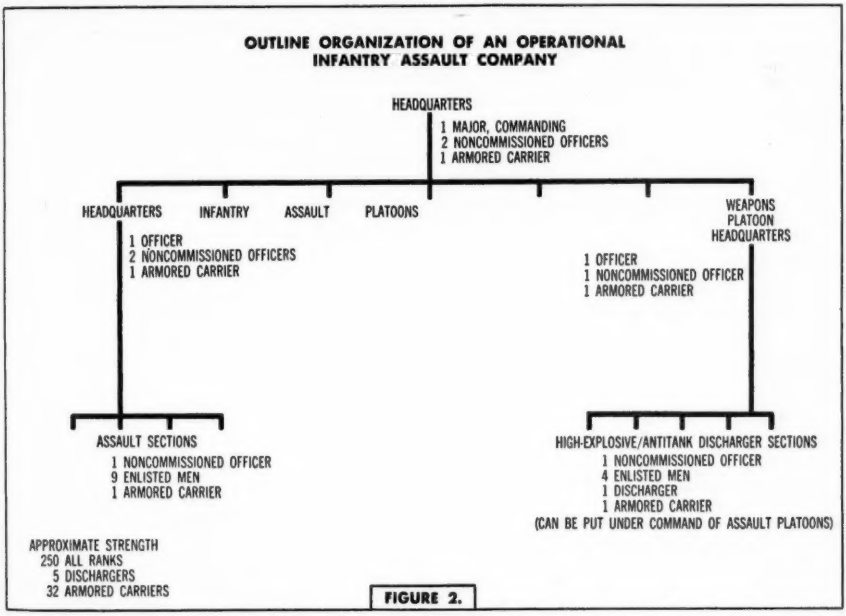


FIGURE 2.

Command and Control

It has been suggested that regiment, brigade, and divisional types of headquarters are too vulnerable for the operations envisaged and that a new command concept is required.

The main factors to be applied in formulating this new concept are:

1. The necessity for reducing the number of personnel and the quantities and size of equipment and vehicles.

2. The increased range requirement of intercommunication mediums.

3. The necessity of relying on air movement for liaison visits and any other command and staff movements between the elements of a force.

4. The acceptance of administrative responsibility by base headquarters.

5. The realization that each operation is complete in itself, although it may be connected with other operations. Within the limits of reasonable flexibility, it is of fixed duration whether it suceeds or fails in its aim.

The highest headquarters that should exist in the field should be that of a task force. All operations requiring control and command at a higher level should be undertaken by a base headquarters. The latter should be static, deep underground,

and proof against thermonuclear attack.

The task force headquarters would command a number of groups of units, these we shall call combat groups. The total number of combat groups in a task force would depend on the task or tasks and their geographical location; ideally, it might be from eight to 10.

carried in the same aircraft as the assault units. Communications would have to be divorced entirely from wire, and would make maximum use of radio, television, and other techniques. Security would be of less importance than range and reliability because of the speed at which operations would move, and the reliance which

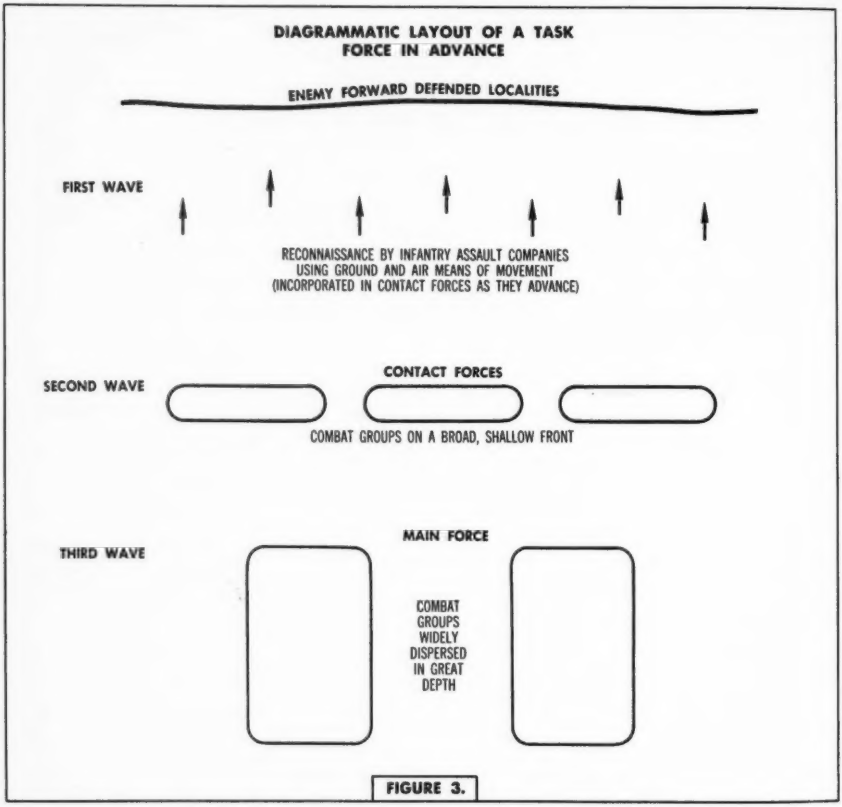

DIAGRAMMATIC LAYOUT OF A TASK FORCE IN ADVANCE
ENEMY FORWARD DEFENDED LOCALITIES
FIRST WAVE
RECONNAISSANCE BY INFANTRY ASSAULT COMPANIES USING GROUND AND AIR MEANS OF MOVEMENT (INCORPORATED IN CONTACT FORCES AS THEY ADVANCE)
SECOND WAVE
CONTACT FORCES
COMBAT GROUPS ON A BROAD, SHALLOW FRONT
THIRD WAVE
MAIN FORCE
COMBAT GROUPS WIDELY DISPERSED IN GREAT DEPTH

FIGURE 3.

A command group headquarters would command anything from five to 10 units, both infantry assault and support.

The headquarters staffs would have to be capable of performing the necessary operations and intelligence tasks from vehicles, and with equipment that can be could be placed on air-transported liaison officers for long messages of high security classification.

Tactics

The main factors to be considered in evolving the correct tactics for the organi-

zation, weapons, and command and control system so far outlined are:

1. The importance of having a worthwhile and realizable objective.—With the limited capabilities of this type of warfare it is essential that the objective is

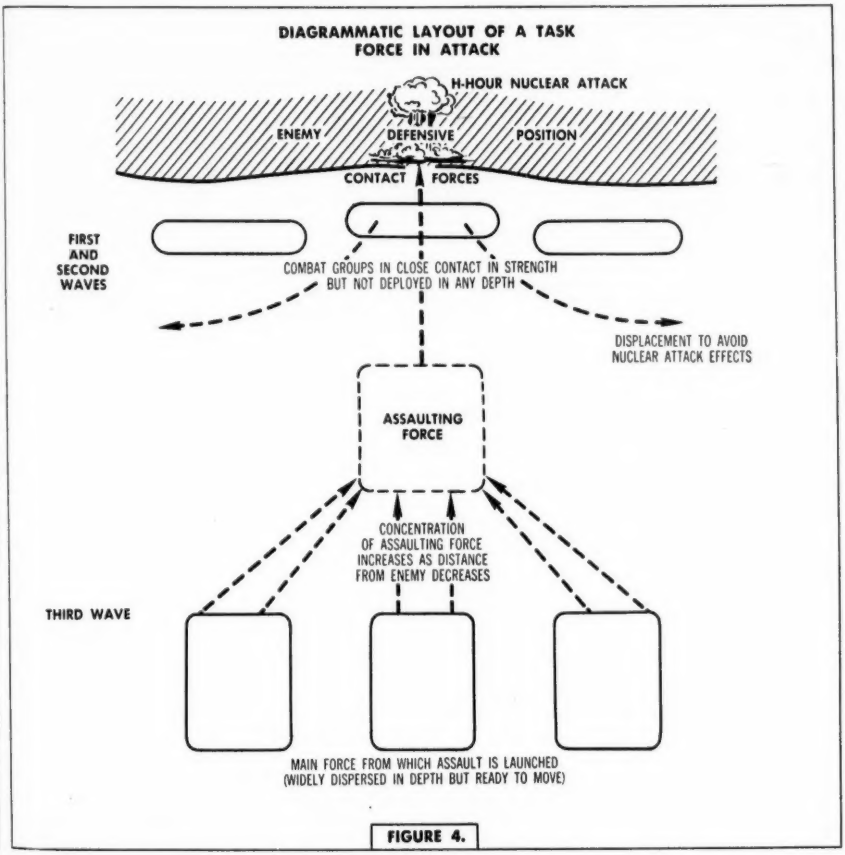

DIAGRAMMATIC LAYOUT OF A TASK FORCE IN ATTACK
H-HOUR NUCLEAR ATTACK
ENEMY
DEFENSIVE
POSITION
CONTACT FORCES
FIRST AND SECOND WAVES
COMBAT GROUPS IN CLOSE CONTACT IN STRENGTH BUT NOT DEPLOYED IN ANY DEPTH
DISPLACEMENT TO AVOID NUCLEAR ATTACK EFFECTS
ASSAULTING FORCE
CONCENTRATION OF ASSAULTING FORCE INCREASES AS DISTANCE FROM ENEMY DECREASES
THIRD WAVE
MAIN FORCE FROM WHICH ASSAULT IS LAUNCHED (WIDELY DISPERSED IN DEPTH BUT READY TO MOVE)

FIGURE 4.

defined clearly. A commander must be prepared to risk the complete destruction of his force to attain this so long as it is realizable.

2. The necessity of avoiding concentrations likely to invite enemy nuclear attack.—The suggested system is called for want of a better name "the three-wave system." It is applicable to both attack and defense. The main principles are that a force should not be concentrated in depth, and distances between waves should be such as to minimize the effect of nuclear attack.

3. Contact should be maintained with strong forces deployed in line as close as possible to enemy forces.

4. In both attack and defense the main

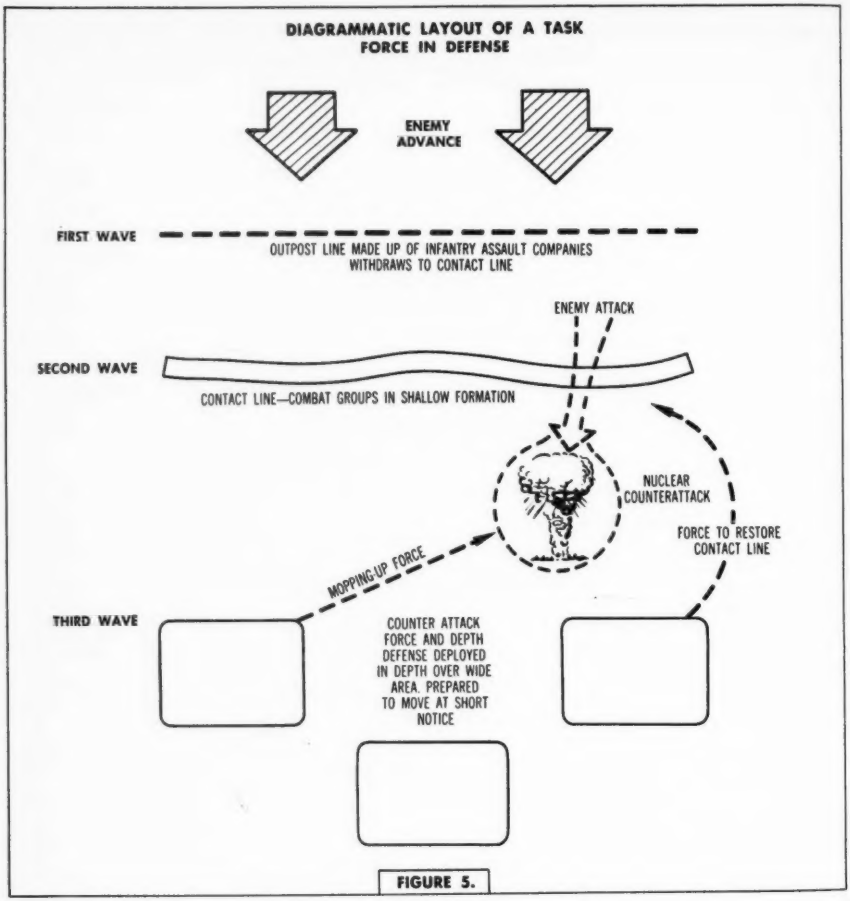

DIAGRAMMATIC LAYOUT OF A TASK FORCE IN DEFENSE
ENEMY ADVANCE
FIRST WAVE
OUTPOST LINE MADE UP OF INFANTRY ASSAULT COMPANIES WITHDRAWS TO CONTACT LINE
ENEMY ATTACK
SECOND WAVE
CONTACT LINE—COMBAT GROUPS IN SHALLOW FORMATION
NUCLEAR COUNTERATTACK
FORCE TO RESTORE CONTACT LINE
MOPPING-UP FORCE
THIRD WAVE
COUNTER ATTACK FORCE AND DEPTH DEFENSE DEPLOYED IN DEPTH OVER WIDE AREA. PREPARED TO MOVE AT SHORT NOTICE

FIGURE 5.

effort should be obtained by the use of nuclear weapons. These principles are shown in diagrammatic form in Figures 3, 4, and 5.

Attack

Reconnaissance would be carried out by the first wave, normally composed of infantry assault units.

Contact in strength would be made as early as possible by the second wave, normally composed of combat groups deployed in line. Their task would be to exert heavy pressure, mainly conventional, along the entire front, and by the closeness of their contact and their lack of depth to prevent themselves becoming targets for enemy nuclear attack. Assault would be carried out by elements of the third wave under cover of nuclear support. Normally, it would involve a carefully timed and executed withdrawal to a flank or flanks by

the second wave in the immediate vicinity of the area of main effort.

Defense

An outpost line or rearguard would be established by the first wave. It would consist normally of infantry assault companies with engineer assault squadron support; the latter mainly for demolitions and the preparation of obstacles.

The second wave would consist of combat groups with their main strength deployed in line and with the minimum feasible depth. Its task would be to force the enemy to concentrate for assault and present a nuclear target.

The third wave would be sited some distance in rear of the second wave and would be in considerable depth. Its main task would be nuclear engagement of enemy forces penetrating the second wave in strength. Electronic means could be used for accurate location of the enemy forces deploying in the area between the second and third wave. This force also would accomplish counterattack and restoration of the second wave front when and where this might be considered desirable.

The allocation of forces to the various waves would, of course, be a matter for the commander, but in general the proportion would be 1:2:2 for the first, second, and third waves in infantry assault unit strength, and 1:2:4 in support unit strength.

The kind of distances that would be used for the suggested deployment would be dependent on the size of nuclear weapons in use and the degree of protection available to our forces. Assuming that the enemy is going to rely on a 20-kiloton tactical nuclear weapon, the figures for an infantry assault company in the defense could be an area of 400 to 500 yards by 200 to 300 yards with gaps between units of not less than 700 yards. In attack these figures might be decreased as the troops neared the actual point of assault in the enemy forward defended localities with a consequent reduction in the risk of a nuclear attack. Distances between waves and combat group frontages can be worked out on similar lines. It is possible that at some further stage, thermonuclear considerations may have to be considered, particularly in respect to the third wave.

What's Our Line?

Digested by the MILITARY REVIEW from a copyrighted article by Wing Commander John Gellner in "The RCAF Staff College Journal" (Great Britain) 1957.

NOT so long ago in times less worrisome for the professional military man, serving officers could view both the present and future with equanimity. They knew that they were indispensable to the nation, and they knew what they would do when the call to action came. Their comfortable assurance rested on the supremacy of tactics (the preserve of the military expert) over strategy in the conduct of operations, and on the predictability of the nature of the next war. The professional officer, if he was ambitious and conscientious, would work at making himself a master of military art and science. He did not have to worry about whether he was studying the right art and the right science or even less, speculate about the rationale of his profession.

It is important to realize that it was only the ever-growing difficulty of handling troops on the battlefield (tactics) which made the officer a professional man, where before he was merely a member of a martial upper class of society. The size of the forces engaged, but even more the

variety and effectiveness of the weapons which made it necessary to maneuver rather than to rush to the attack, called for command by military experts. Their emergence coincided with the establishment of standing armies, or roughly with the campaigns of Gustavus Adolphus.

About the same time, the professional naval expert in seamanship, navigation, and naval tactics—the "tarpaulin"—began to replace the gallant, aristocratic amateur—the "gentleman"—in the command of men-of-war. Military leaders from the 17th century up to and including the Second World War generally agreed in considering tactics as the part of their task more difficult and more important than strategy. Lord Wavell illustrates this point by drawing an analogy from contract bridge:

The calling [bidding] is strategy, the play of the hand tactics. I imagine that all experienced cardplayers will agree that the latter is the more difficult part of the game, and gives more scope for the skill of the good player. Calling is to a certain degree mechanical and subject to conventions; so is strategy, the main principles of which are simple and easy to grasp. . . . But in the end it is the result of the manner in which the cards are played or the battle is fought that is put down on the score sheets or in the pages of history.

In the realm of tactics any professional is superior to the most brilliant amateur. The story is told of how Machiavelli, the author of *The Art of War*, failed miserably when trying to demonstrate his tactical doctrine in command of a regiment of *landsknechts*. Hitler, who without doubt had a flair for strategy, probably could not have moved a battalion. The more involved military tactics became, the more indispensable were the experts in tactics—the professional officers. Their position was strengthened further by the growing complexity of the logistic problems connected with the administration and supply of huge and lavishly equipped military forces.

The Change

The advent of weapons of absolute destruction has brought with it a reversal of the order of importance of strategy and tactics in a nuclear war. Strategy—the art of bringing his forces to the battlefield in favorable position—obviously now will be the military leader's main concern. The tactics of an attack with nuclear weapons may be very simple: targets clearly will have to be predetermined in peacetime and allotted to weapons carriers; the latter, even if manned, will have little scope for maneuver; and the destructiveness of the weapons will make accuracy a minor consideration. In any event the forces which will deliver the knockout blow will be small; they will start and be directed from a long-established logistic base.

If the next war necessarily must be a nuclear one—and a series of pronouncements by Western military leaders indicate that we intend to counter aggression with nuclear bombardments of varying severity—then the importance of the military profession inevitably must decline. For strategy, and especially strategy in a nuclear slugging match, is not the exclusive preserve of the professional.

Indeed, much searching inquiry into the requirements for and the conduct of future war, that is, much of the thinking in the realm of grand strategy and strategy, is done by men with backgrounds in military history, philosophy, and science, such as Bernard Brodie, Henry Kissinger, Warren Amster, and Liddell Hart. They work in a field which, in the times of the preeminence of tactics, almost entirely was occupied by professional military men such as Clausewitz, Jomini, Moltke, and Douhet.

War itself has lost its traditional meaning. When the weapons used are nuclear bombs, war clearly can no longer be re-

garded as a "continuation of state policy by other means." Complete destruction and mutual suicide are not policies.

With enforcement now tantamount to murder, and almost certainly to murder and suicide, the professional "enforcer" has lost his traditional place in the apparatus of the state. He is called to action only for the final "Twilight of the Gods." Nor does the proposition that "military forces today are not designed to wage war; their purpose is to prevent it" sound convincing.

The aim of the police is to prevent crime, of the medical profession to prevent illness, however, a policeman would not be a policeman if he could not subdue a criminal, a doctor would not be a doctor if he could not cure a patient. What then of armed forces which could not wage and win wars?

The thoughtful professional officer of today thus cannot evade asking himself these basic questions: "What is my function in society?" and "Am I really necessary for the proper functioning of society?" In other words, he must ask himself what the requirements for national security are in the nuclear age and what he, and only he and others of his profession, can do to fulfill those requirements.

Nuclear War

A national policy and grand strategy based on the determination not to attack anybody, but to counter aggression with all weapons in one's own, and in allied, arsenals would be comparatively simple to translate into strategy and outright easy to execute tactically. No power or combination of powers which did not possess nuclear weapons could possibly tangle with one which did possess them or with one protected by a "have" power. All that would be necessary would be to maintain a retaliatory capability sufficient to deter any enemy, who also possessed nuclear weapons, from launching an attack.

Essential components of such a deterrent force would be the nuclear weapons carriers themselves, shielded by a defense organization designed to give warning of an approaching attack. Forcing the enemy to fight his way through a defended area will deprive him of the advantage which generally goes to him who strikes first. The amount of force necessary to bring about a "deterrent state" can be determined with precision.

The Basic Weakness

The basic weakness of a national military policy such as that which we have just outlined becomes apparent as soon as "deterrence" is defined. It is a method of forcing rational behavior through the fear of self-destruction.

Hitler, in the chancery bunker in April 1945, was not rational, and there was no threat that could have made him behave rationally. In fact, his wish was that Germany should join him in suicide, and he would have taken the world along had he known how to achieve this. There is always the possibility that we may be faced with an enemy ruler who cannot be deterred because he does not think rationally. Even at the present stage of weapons technology it is conceivable that a single madman could destroy humanity.

A much more serious objection against complete reliance on deterrence as a means of preventing war is that it not only deters aggression, but also resistance to aggression. The temptation necessarily will be great to qualify enemy attacks with such adjectives as "local" or "minor," to give to the term "aggression" the widest and the most liberal interpretation because a strict interpretation must lead to cataclysm. A grand strategy that calls for unrestricted nuclear warfare as a counter to aggression is essentially a bluff which an enemy could call in a succession of hostile acts. None need be serious enough to make retaliation with nuclear weapons likely, but each would be designed to give the aggressor definite po-

litico-military advantages. In this way, a power relying entirely on nuclear weapons could be slowly throttled.

Graduated Deterrent

The concept of the "graduated deterrent" has been evolved as a seeming way out of this impasse. It envisages "threatening realistic retaliation against aggression only with weapons 'graduated' to the scale of the attack." These weapons still would be nuclear, but there would be limitations as to the quantity and quality of the weapons themselves and the areas and targets against which they would be used. The official grand strategy of the leading nuclear power in the West, the United States, is clearly no longer "massive retaliation" but rather "graduated deterrence." For instance, Mr. Dulles has stated unequivocally that "our capacity to retaliate . . . would be selective and adapted to the occasion."

There are many who believe that a graduated deterrent is no deterrent at all, and that a declaration of graduated deterrence "could not do other than increase the risk of war." This is debatable. But even if we accept that limited nuclear warfare is a formidable enough threat to deter aggression, the difficulty still remains of envisaging how such warfare could be conducted if "graduated deterrence" in fact failed to prevent it.

Because we cannot rely on the enemy "playing the game," the only way of making him abide by the rules of limited atomic warfare (whatever they may be) is to let him know that we will match him nuclear weapon for nuclear weapon. This looks fairly reasonable on paper but is quite impossible in practice. With national survival at stake we could not, in every case, wait and see what the enemy will do to us before retaliating in kind, as the next blow may deprive us of our capacity to retaliate. For instance, the commander in the United Kingdom could not wait to find out the intentions of a force of enemy aircraft approaching the shores of Britain, but would have to launch his V-bombers against their allotted nuclear targets.

Limited War

In fact, limited nuclear war is conceivable only under the most absurd conditions with both sides inspecting their enemy's forces before they are launched into battle, and with sanctuary areas set aside which not only must not be attacked, but must not even be approached. Above all, the retaliatory forces of both sides would have to be made completely safe from attack. As Henry Kissinger states:

With a doctrine of limited war, many of the long cherished notions of warfare will have to be modified or abandoned. One of the cardinal principles of air strategy is that wars can be won only by dominating the air space completely. But any attempt to deprive an enemy of his retaliatory force would inevitably bring on all-out war. Confronted by the prospect that it will be completely impotent once its retaliatory force has been destroyed, a power will almost certainly decide to use it to deprive its opponent of the means to impose his will. Thus the minimum condition for limiting war will be the immunity of the enemy's retaliatory force.

Thus in a limited atomic war Great Britain would be safe from nuclear attack by being the sanctuary area of the V-bomber force. But practically all of Europe would be equally safe because the sanctuary areas, to be effective, would have to extend to a distance of at least 600 miles (one hour's flight for a jet bomber today) from the British bomber bases on one side, and from the Russian on the other. These two circles would intersect. These sanctuary areas would have to be extended as attack speeds increased until, with the advent of the intercontinental ballistic missile, every point on the globe will be within one hour's flight of the attack weapon from wherever it is

launched, and thus the entire earth would have to be a sanctuary area for the retaliatory forces. As to the minute inspections behind the enemy lines, which would be a requirement in a limited nuclear war, it has been suggested that as a consequence the battles in such a war "will approach the stylized contests of the feudal period."

We have said earlier that a war between a power which had nuclear weapons and one which did not have them is unthinkable, as there would be no contest and the "have not" would have to submit at once. It seems incredible that a war between two powers possessing nuclear weapons, and determined to use them could remain limited as to area, targets attacked, and weapons used. The inescapable conclusion then is that any war with nuclear weapons must be fought all out, no holds barred.

The Course of War

One last point must be discussed before we leave the subject of nuclear war: the probable course of a contest of that kind. Field Marshal Montgomery has traced it with great lucidity and vividness. He sees the third world war run through three distinct phases, of which the first two interest us here: Phase 1, or the Destructive Phase, and Phase 2, or the Exploitation Phase. The latter often is called the "period of broken-backed warfare."

Field Marshal Montgomery does not say so outright, but from the results which he foresees it is clear that he believes that in Phase 1 the two sides will go at each other with all they have. In this short, nuclear slugging match the enemy is crushed; our side is badly crippled, but we "retained a number of piloted aircraft and missiles, and there were still some nuclear warheads left." Thus we emerge the victors. Thereafter, in Phase 2, military operations are only of secondary importance. Enemy forces are shepherded back to their homeland into which only short forays are made to destroy the remnants of the enemy's nuclear capacity. In the Exploitation Phase it matters little how our forces are armed—any serious resistance will be put down by the threat of nuclear bombardment which no longer can be opposed or repaid in kind. In this phase it is simply the case again of a power possessing nuclear weapons (albeit a terribly weakened one) imposing its will on a power which does not possess them.

This widely accepted concept of the war of the future suffers from a basic weakness: it assumes that *all* countries possessing nuclear weapons will be engaged in Phase 1. Self-interest would dictate that a lesser power with nuclear capabilities would sit out this phase of the contest between the two world powers.

In Phase 2 with nuclear strength unimpaired it might then be able to impose its will on victor and defeated. At any event, even if it wanted to take sides from the beginning, such a lesser power might not have time to join in the fray before Phase 1 was over. At present only three countries possess nuclear weapons, and the Soviet Union would probably attack Great Britain in the same hour as the United States to forestall any possibility of an unengaged third party emerging the victor from the battle of the giants.

In a few years, however, a number of countries may have nuclear capabilities and it will no longer be possible for an aggressor to destroy them all as a precautionary measure, while aiming his main blow at the United States. That means that he who wants to win in a nuclear war must wage both unrestricted and global warfare. He must use the most destructive weapons in his arsenal and he must not spare any country which has nuclear capabilities.

In the planning and preparation for unrestricted global nuclear war and in the fighting of it, if it came, the professional officer would play a role, but not so im-

portant a role as in the past. It would be all strategy and no tactics. In the strategic field the technical expert would, of necessity, be more important than the military. The weapons carriers will be manned for some years to come but the task of the crews will call for skill only, not for mastery of the art of war. Even their job one day will be done by robots. As was pointed out earlier, the acceptance of the concept of "nuclear war or nothing" must bring on the sundown of the military profession.

Old-Fashioned Wars

It is clear that nuclear war must be avoided and that the states possessing nuclear weapons, provided they are ruled by rational men, will do all in their power to avoid it. Yet human conflict is unavoidable. Differences between various states and combinations of states are as acrimonious as ever.

The two big Eastern dictatorships, the Soviet Union and Red China, are perhaps at the height, or nearing the height of, the dynamic stage of their development. There will be warfare in the future just as there is warfare today, most likely on the lines suggested by Liddell Hart:

The enemy can exploit a choice of strategic techniques, different in pattern but all designed to make headway for the aggressor while causing hesitancy on the other side in taking the fateful decision to order counteraction with nuclear weapons. Such aggression might be made at a limited tempo—a gradual process of encroachments. It might be made at a fast tempo, but to a limited depth—small blitz bites swiftly made, and as swiftly followed up by a conciliatory offer to negotiate. It might take the form of stirring up internal revolt in another country, and then infiltrating or parachuting reinforcements of 'volunteers.' It might also take a purely subversive form.

It would be futile to assert that we will stop such creeping aggression with nuclear weapons, big or small, for we will not. Indeed, we must admit that we have no option but to counter with conventional arms, minor acts of aggression perpetrated by a power possessing nuclear weapons. The sooner we provide ourselves with enough of these arms for effective resistance, the safer we will be, and the more likely it will be that peace will be preserved.

Let nobody say that we could never match the East in manpower or conventional arms. The population of western Europe alone is greater than that of the Soviet Union. There is no point in counting Chinese heads. For many years to come the United States will be able to field *effective* (properly equipped, armed, trained, and supplied) military forces stronger than Red China's. Nor are the costs of armaments beyond the capacity of the economies of most of the Western democracies—it is only our refusal to retrench elsewhere that makes them appear excessive.

The point is that we *must* deter limited (minor, local) aggression by brandishing conventional arms, because nuclear deterrence is effective only against aggression with nuclear weapons, that is, against the threat of unrestricted, global, nuclear war.

Peace Preservation

A minor war which may develop from limited aggression by the Soviet Union or Red China, or much more likely by a country which is a pawn of the Soviet Union or Red China, could lead to nuclear war. Almost certainly it would lead to it if the West opposed such aggression with nuclear weapons. Even a conflict in which the interests of the powers possessing nuclear arms were not directly involved could, if it lasted too long and if it spread, bring about a clash of the giants. As nuclear war constitutes a deadly peril for all countries, belligerent and nonbelligerent, it must be

in the interest of all countries to prevent the outbreak of hostilities anywhere in the world, or to put a quick stop to hostilities that may have started.

Living as we do under the sword of Damocles of nuclear war, *collective security* is a matter of utmost urgency, and *peace preservation* is everybody's business. It is the business of Canada perhaps more than of any other country because her geographic position makes her the battleground in a war between the two great world powers. Some countries perhaps may be able to ride out Phase 1 of a nuclear war. Canada certainly cannot.

Thus it is not surprising that Canada has taken the lead in developing the concept of peace preservation as the principal politico-military task, and that Mr. Lester Pearson is the foremost exponent and propagator of that concept. The idea is, of course, not new. It appeared in the Covenant of the League of Nations, and was embodied into the Charter of the United Nations, article 43 of which provides for the basic machinery for the practical implementation of the principle.

International Action

Except in the case of Korea, when the fortuitous circumstance that the Soviet Union just happened to boycott the Security Council enabled that body to perform the task for which it was designed, the United Nations has never been able to enforce its peace resolutions. Only on that occasion was the world body able, to use Mr. Pearson's words, to put forceful "international action behind international words."

The United Nations Expeditionary Force, useful as it is under the circumstances, clearly is not an effective peace preservation force. It did not stop the war between Israel and Egypt nor would it have been capable of stopping it. This was done by the Anglo-French intervention despite, rather than on behalf of, the United Nations.

Obviously, it would be highly desirable that a military force should exist—impartial, motivated only by its sense of duty to preserve peace, always available and highly mobile, and strong enough to beat out any spark of armed conflict. As an alternative solution (and one more practical because it is more easily attainable) the United Nations should be able to call on a member country to go and preserve peace in this or that part of the world. Such national forces, operating under a United Nations mandate, again should be fighting forces capable of reaching the trouble spot quickly to impose peace upon the belligerents or would-be belligerents, if need be by force of arms.

Mr. Pearson clearly contemplates the use of either one of these methods, or perhaps of even both, but as a practical statesman he approaches the problem cautiously:

Even if governments are unable to give the UN a 'fighting' force ready and organized to serve it on the decision of the Security Council, they should be willing to earmark smaller forces for the more limited duty of securing a cease-fire already agreed upon by the belligerents. We might in this way be able to construct a halfway house at the crossroads of war, and utilize an intermediate technique between merely passing resolutions and actually fighting. . . . The first step would seem to be to create a permanent mechanism by which units of the armed forces of member countries could be endowed with the authority of the UN and made available at short notice for supervisory police duties.

It is clear that this "halfway" solution must be followed as quickly as possible. Either through the cumbersome procedures of the United Nations *or* by the initiative of countries which have a vital interest in preserving world peace we must generate peace preservation forces capable of pushing belligerents apart instead of merely keeping them apart.

The main characteristics of such forces should be uncommonly great firepower (without nuclear weapons) for the number of personnel employed, and the highest degree of mobility. Expert leadership that would be imaginative and would combine prudence with forcefulness would be necessary as well as purposeful and courageous political direction.

Our Line

From what has been said here, the following grand strategy for the West emerges:

1. We must deter nuclear war by maintaining a strong nuclear retaliatory force shielded by an effective defense system.
2. We must state unequivocally that we will counter any nuclear attack with all we have—we may as well do that as nuclear war must quickly become unrestricted and global, anyway. Also that we will not use nuclear weapons unless the aggressor uses them.
3. We must deter any war by maintaining strong conventional forces.
4. We must earmark a particularly heavily armed and completely mobile (air-transportable) portion of our conventional forces for peace preservation anywhere on the globe.

Such a military policy would free us from the mesmerizing and debilitating effects of complete reliance on nuclear weapons to ensure national security. It would go a long way toward making armed force again, as it used to be, a legitimate extension of diplomacy. It would help to keep world peace more effectively than dark threats of megaton-yield bombs. The implementation of such a grand strategy would make the greatest demands on the professional men who would have to execute it.

The military profession has for years now tended to become a learned profession. Those who, in the nuclear age, are called upon to ensure national survival by maintaining peace and winning wars if need be (for wars can still be won, albeit perhaps not nuclear wars) will have to be men truly learned in the military art and science. Nothing less will do.

Army Organization in the Atomic Age

Digested by the MILITARY REVIEW from an article by Captain Bo Forsman in "Ny Militär Tidskrift" (Sweden) Nr. 10, 1957. Translation by Mr. LaVergne Dale, Leavenworth, Kansas.

SINCE the Hiroshima and Nagasaki bombs were dropped the threat of atomic war has hovered over the human race. Both military and civil defense measures have been more and more oriented to the thought that atomic warfare will, in the end, become a reality.

Under these conditions, in all the more powerful military countries, effort has been made to organize their respective armed forces and to adapt their military tactics for the eventuality of an atomic war. Since NATO's political representatives officially have approved the use of atomic weapons in principle, NATO units gradually have had to be modified in accordance with this decision.

In the face of this, the Soviet armies also have been adapted to the requirements of atomic warfare. Even as early as 1946 it was recognized clearly that concentration of forces and combat matériel, such as occurred during World War II, was hazardous due to the new means of destruction.

The Soviet Union

The Soviet Army is strongly mechanized. It is believed that 65 of its 175 divisions are armored or mechanized di-

visions which, as a rule, are combined to form mechanized armies. Long before the Western Powers had even started with their organization efforts, divisions of unconventional character had been created in the Soviet Army.

The *mechanized* division's three mechanized regiments constitute, actually, small armored brigades of close to 2,500 men with reconnaissance units, infantry (three battalions), tanks, heavy mortars, and maintenance units. A heavy and a medium heavy armored regiment, heavy artillery (8.5-cm cannon, 12-cm howitzers, 16-cm mortars, rocket guns, and antiaircraft guns), and engineer and maintenance units also are included in the division.

Its personnel strength amounts to approximately 15,000 men. More than 340 tanks and assault guns, together with 100 heavy mortars and pieces of artillery, go into the division.

The *armored* division consists of five combat regiments, but with a larger percent of tanks than the mechanized division. However, each of the three medium heavy armored regiments includes a rifle battalion, one motorized infantry regiment (of armored personnel carriers), and a heavy armored regiment. Its divisional artillery is identical to that of the mechanized division, and its personnel strength does not amount to more than 13,000 men, but the number of tanks and assault guns is 400 or more.

The *infantry* division's organization has not been changed to any major degree. Its three infantry regiments have been retained, but have been motorized and equipped with the new armored personnel carriers. A medium heavy armored regiment of about 80 tanks and assault guns and strong divisional artillery complete the picture of a modern infantry division. Its personnel strength is approximately 13,000 men, around 90 tanks and assault guns, and a like number of artillery pieces and heavy mortars.

United States

Since the end of World War II the American divisions have undergone various changes, all of which have been in the direction of decreased personnel and vehicle strength but, at the same time, increased firepower. Last year a very thorough revamping of its organization occurred.

The most important changes are:

The personnel strength of the *infantry* division has been reduced from 17,500 to 13,700 men (in 1950 its strength was nearly 19,000).

The traditional three infantry regiments have been replaced by five combat units of around 1,500 men.

Armored, engineer, and artillery units are organized in such a way as to be able, respectively, to reinforce the combat units with a tank company, an engineer company, or a light howitzer battery.

The divisional artillery has been given guns which are able to fire atomic projectiles, 20.3-cm howitzers, and *Honest John* rockets.

The *armored* division has not undergone such great changes and, generally speaking, has retained the organization that was given it during World War II. Its personnel strength has been reduced, however, from 16,000 to 13,000 men.

The divisional artillery has been given atomic weapons to the same extent as the infantry division. Its matériel, naturally, has been advanced and improved greatly over the years. Notable are the facts that no heavy tanks are making their appearance and that the artillery is entirely on tracked mounts and is armored.

The *airborne* division's personnel strength has been reduced from 17,000 to 11,500 men and, as with the infantry division, a five-sided organization has been introduced. The combat units are, however, somewhat smaller. The divisional artillery has no heavy pieces, but has rockets which can carry atomic warheads.

France

In September 1954 a new French operational unit, the light brigade called the *Javelot*, appeared. This brigade comprised around 7,500 men and showed itself to be a very mobile and flexible unit. Its most noteworthy feature was the division of its combat forces into mixed battalions (*regiments d' inter-armes*) comprising tank, armored infantry, and artillery units. Typical of its equipment were the light *A.M.X.* tank and the wire-controlled *SS-10* antitank rocket.

The next year this unconventional organization was tested again, this time in the form of a light mechanized division in which personnel strength had been increased to 10,000 men and striking power had been augmented considerably.

This division is characterized by a very strong reconnaissance organization. This consists of a highly qualified light infantry unit, a reconnaissance battalion with 70 heavy armored cars and a self-propelled howitzer battery, together with a number of other type battalions. Both a unit of four mixed battalions and another of two mixed and one purely infantry battalion, appeared during the tests.

The mixed battalion arouses the greatest interest perhaps, because of its special organization. Its infantry, that is to say, its three armored infantry companies (the French term, *compagnie de voltigeurs antichars*, indicates the unit's antitank character) are equipped abundantly with antitank and automatic weapons. In addition to antitank functions, they also constitute the battalion's rifle forces. Around 200 light and heavy machineguns, over 80 rocket launchers, and, in addition, 40 cross-country vehicles (*Unimog*) with the *SS-10* antitank rocket are in the battalion. The two tank companies have *A.M.X.* tanks, and the light howitzer battery has guns on the same chassis.

The battalion's personnel strength amounts to over 1,500 men and, counting tanks and tracked howitzers, the number of vehicles rises to around 450. The battalion has a remarkably large number of radios—over 600.

The division was especially capable of performing its missions both during the trial *Eclair* maneuver and the NATO *Cordon Bleu* maneuver. Its organization was well-adapted, above all, for mobile delaying combat and for repeated counterattacks on an advancing enemy.

Great Britain

The British organizational efforts have been oriented toward the creation of a "universal division," that is, an infantry division which should be able to solve all "usual" problems, and an atomic division, —an armored division which should be able to exploit the effect of atomic combat means.

The conventional three brigades have been retained in the *infantry* division, but the brigades have been reinforced, among other things, by a tank battalion. The development is in the direction of independent brigades with tanks and light artillery as well as infantry.

The rifle battalion composition has been simplified by the fact that mortars and antitank guns have been taken out of its organization. Its missions have been taken over by artillery and tanks in the framework of the brigade.

The missions of the *armored* division have been rapid operations for the purpose, for example, of the exploitations of atomic weapons, the seizure of important terrain before operations, or the execution of strong reconnaissance attacks. Its organizational foundation is the four tank battalions equipped with *Centurion* or *Conqueror* tanks. Only one rifle battalion, carried in armored personnel carriers, thus far has been included in the division, but experience has shown that this infantry strength has been insufficient in many situations. It is likely that an additional rifle battalion will be added.

A 15-cm artillery battalion on self-propelled mounts, an armored car battalion, and an engineer battalion together with maintenance units completed the formation as an operational unit.

Tests have revealed various defects in its organization and it is likely that the British will end with a brigade organization that greatly resembles the Swedish. In Parliament the Minister of Defense outlined an infantry brigade of three rifle battalions and one tank battalion, and an armored brigade of three tank battalions and one armored rifle battalion. The desirability of an additional battalion in the brigade has been advanced, but it is intended, nevertheless, to hold its strength down to a level of from 4,000 to 5,000 men.

West Germany

The organization of three infantry and two armored divisions has been begun. The Germans have taken account of the latest experiences gained from atomic weapon tests and military exercises, and the organization of these units is characterized by flexibility, mobility, and firepower.

The *infantry* division is entirely motorized and consists of seven independent rifle battalions, one tank battalion, one antitank battalion, and an artillery regiment of three battalions. Regimental organization occurs only with the artillery. With this exception, the battalions are joined together in temporarily constituted combat units. The effort was made to keep personnel and vehicle strength low. At first a figure of 10,000 men was set as the limit but the division now consists of at least 13,000 men.

The *armored* division, like the infantry division, also lacks regimental organization except as regards its artillery. Three combat unit staffs are provided for commanding the unit: three armored battalions, three armored rifle battalions, one armored reconnaissance battalion, one antitank battalion, and one engineer battalion. The artillery has the same strength as in the infantry division, but it is entirely self-propelled. Its personnel strength amounts to 12,500 men, and the number of its tanks and assault guns is over 300.

Sweden

The Swedish brigade organization has existed since the years of the emergency and came into being more for the purpose of creating a large number of operational units than for meeting the requirements of modern combat means. It must not be supposed, therefore, that the Swedish Army organization is fully modern. Due to lack of appropriations its needed modernization with respect to organization and equipment is proceeding slowly.

The Swedish infantry brigades can, in fact, no longer be considered as operational units. They lack the necessary strength and staying power for operational tasks. Not even the armored brigades which possess organic light artillery can be said to meet the requirements of an operational unit. In relation to the personnel strength of our units, they have notably weak firepower.

If compared with the organizations of other countries, the latter often are found to possess from two to four times greater firepower in relation to their personnel strength. That the Russian units have had very great firepower with small personnel strength has, it is true, been known for a long time, but the old idea that the units of the Western Nations should have such a large "tail" to drag along and that they were inferior in fire to the Russian units, is entirely misplaced. The American, West German, and French units have a firepower which far exceeds that of the Russian formations.

If there are any units which need "to cut off their tails and sharpen their teeth," it is our Swedish units. No rifle battalion of any other country has, for example, so large a personnel strength and so many

vehicles in relation to its firepower as the Swedish.

As far as the Swedish armored brigades are concerned, they are hardly armored formations in the international sense. In relation to its personnel strength a Swedish armored brigade has less than half as many tanks as, for example, a Russian mechanized division or a German armored division. To this is to be added the fact that our armored brigades lack completely the special armored infantry of the other countries.

The Swedish armored infantry, which continues to use bicycles as a means of transportation, would be handicapped greatly on a battlefield ravaged by atomic means in comparison with modern infantry in armored personnel carriers. Likewise, the artillery in our armored brigades is without armored self-propelled mounts which have been largely introduced in the armored units of other countries.

The Future

Swedish numerical inferiority is indisputable. This inescapable inferiority must be counterbalanced by quality. In future, as in prior wars, the combat morale and discipline of our troops, together with skillful command and good training, will be decisive. All parsimoniousness, when it comes to creating good troops in time of peace, will meet with a terrible reward.

The lower commanders must be chosen from among our nation's best men and be trained to lead their troops skillfully, energetically, and flexibly. A good unit is not created simply by a good relationship between command and men and comfort-promoting measures, but, above all, by plenty of chances for realistic training. Lack of ammunition, motor fuel, and equipment of different kinds operates detrimentally on both leaders and troops in training. Only a well-trained unit feels secure and superior to its adversary's masses.

It is especially difficult to create the command which, through promptness in decision, dynamism of character, and audaciousness, is suited for leading our few armored formations. The basis of superiority on the field of battle resides in the lower command levels.

This implies a concentration of our few, capable troop commanders in a smaller number of units which, in return, will solve our operational problems.

Also our resources in the way of matériel are limited.

This fact necessitates the concentration of our tanks and all of our remaining armored matériel in our operational armored units, and our light weapons equipment in our infantry units.

The many possible directions of enemy attack call strongly for a large number of operational units, but our problems can be solved by extensive cooperation between army formations and naval and air forces. Economy would have to be exercised with respect to the number of our operational units, but not with respect to their quality. A smaller number of well-equipped and well-trained units always have possessed the possibility of beating a numerically superior adversary, but the opposite case has less often illuminated the pages of military history.

Characteristics Needed

The new operational units we create for a future war in which, with great likelihood, atomic combat means will be employed, would have to be of an entirely different character than our present ones.

This character should include the following:

1. High quality of command from the brigade commander down to the leader of the lowest troop unit.

2. Strong firepower, that is to say, infantry strongly equipped with automatic weapons, copiously provided with close-in antitank defense means, and with strong

mortar and long-range antitank defense support.

The armored units will comprise a large nucleus of tanks (less than 100 tanks should not be tolerated in an operational armored unit) and strong armored infantry in armored personnel carriers of strong firepower.

The operational units' own fire will constitute the decisive complement to the atomic weapons which are engaged by superior commanders. But the atomic detonations can never be fully covering, and for this reason a light artillery unit should be comprised in the brigade, on self-propelled mounts for the armored brigade, and tractor-drawn for the infantry brigade.

3. A high degree of mobility will be our foremost weapon for counterbalancing the adversary's superiority and for avoiding losses by atomic combat means.

The enemy's superiority in aircraft, artillery, tanks, and other equipment makes it an urgent necessity that our units also be organized, equipped, and trained for active operation in darkness, fog, poorly surveyable terrain, or under other conditions where the factor of surprise can be exploited.

The rapid tempo that must be expected in the case of an attack supported by atomic fire renders strategic mobility extremely necessary. In addition to this, the destructive effects of the atomic weapons require great capacity for movement off the roads. In order to fulfill this requirement, the brigade will have to depend entirely on all-terrain vehicles and aircraft. Standard vehicles are entirely unusable in a fighting unit if the requirement of operation off roads is to be met, especially in wintertime or when roads are impracticable.

4. Great staying ability in combat is necessary for the unit to be able to continue in combat over considerable periods without getting out of balance through heavy losses—by atomic explosions for example. It is necessary to be able to arrange the relief of the rifle or armored battalions so that they will not be worn down while their support and maintenance units are not being used. Our present four battalions are insufficient and must be increased to five or six.

We have built our Army into a new, streamlined force, new in concept, new in powerful atomic weapons and other modern equipment, new in mobility, and with a new dual capability. Our Army today has a one-two punch—the ability to fight effectively either with atomic or nonatomic weapons—to cope with the possibility of an unlimited nuclear conflict as well as with the more likely contingency of limited war.

Secretary of the Army Wilber M. Brucker

BOOKS OF INTEREST TO THE MILITARY READER

ROCKET. By Air Chief Marshal Sir Philip Joubert de la Ferté. 190 Pages. The Philosophical Library, Inc., New York. $6.00.

BY LT COL GEORGE D. CARNAHAN, *OrdC*

The rocket story which the author unfolds—from man's first modest efforts to Peenemünde—is one of fascinating technical interest. The complete planning for the Allied massive air attack on Peenemünde, and the detailed description of the execution of this attack are masterpieces of colorful writing.

The story of the development of the *V-1* and *V-2* rockets is one of overcoming seemingly impossible handicaps. Numerous examples are portrayed to indicate the delays and frustrations caused by unknowing, uninformed, and unimaginative German senior officers. The endless meddling, indecision, and negative attitudes of senior officers was fortunate for the Allies, as borne out by this quote:

If the efforts of Colonel Wachtel, in charge of V-1 *bombardment and commanding officer of the Special Flak Regiment 155W, had not been interfered with . . . some 600,000 flying bombs could have been launched against Britain between June and September 1944. In fact, only 5,430 were discharged, causing 6,100 deaths and injury to 17,300 people. Approximately one million homes were destroyed or damaged in Greater London. If the 600,000* V-1's *had arrived at their target the loss should, statistically, have been* one hundred times *greater, and thus would have had a marked effect upon the population and upon the direction of the war from our capital city. If these weapons had been fired at the assembly and dispatch areas of our invasion forces there might have been no landing in Normandy. The war would then have dragged on for many months and might even have ended in an Allied defeat.*

Air Marshal Sir Philip Joubert has skillfully interwoven historical facts, military forecasts, and criticism of foreign policies of the United States and of Great Britain into a most interesting story.

THE SHIP WITH TWO CAPTAINS. By Terence Robertson. 256 Pages. E. P. Dutton & Co., Inc., New York. $3.95.

BY CAPT E. M. STEVER, *USN*

Those who like "now it can be told" versions of top secret World War II exploits will enjoy this account of the adventures of the British submarine, *H.M.S. Seraph.*

Among the *Seraph's* hush-hush experiences was that of spiriting General Giraud out of France prior to the North African invasion. French insistence that the job be done by an American submarine (of which there were none within 3,000 miles) caused authorities to resort to the unique alternative of using a British submarine, flying the American flag, and under the nominal command of an American naval officer. The US officer selected was Captain Jerauld Wright, *United States Navy,* now an admiral wearing the twin hats of Supreme Allied Commander Atlantic and Commander in Chief, Atlantic Fleet.

UKRAINIAN NATIONALISM 1939-1945. By John A. Armstrong. 322 Pages. Columbia University Press, New York. $5.00.

BY MAJ HARRY H. JACKSON, *Inf*

This excellent and authoritative study is one of a series prepared under the auspices of the Russian Institute of Columbia University. The work is an effort to evaluate the potentials of Ukrainian nationalism (the doctrine that persons of a distinctive culture should constitute an independent state) during the World War II era. The study primarily is political in theme, but is related closely to the German-Soviet military operations in the area.

Ukrainian nationalism made an effort to appeal to a common historical tradition. This tradition transcended the political boundaries of the USSR and included Ukrainians in Poland, Czechoslovakia, and Romania. This nationalism came into conflict with the policies and goals of both the Germans and the Soviet Union during World War II.

Initially, the Germans made a limited effort to capitalize on the Nationalist aspirations of some Ukrainian political groups, but this policy was abandoned as the SS took over the direction of occupation activities in the Ukraine. The fantasies of German policy in Russia combined with the arrogant stupidity of the *Reichskommissariat* in dealing with the Ukrainians dissipated any early gains in the field of cooperation.

In discussing the leadership and participation of the Ukrainians in the Nationalist movement, the author indicates that only a small element of the population took an active part in the efforts. Ukrainian nationalism attacked a large portion of the urban intellectuals and technicians but never did penetrate the peasant mass of the population. The fanatic devotion of a small minority of Ukrainian Nationalists was no match for the terror machinery of the Nazis and Communists.

This book is a valuable contribution in the field of Russian studies. The utter failure of the Wehrmacht and German Government to capitalize effectively on Ukrainian nationalism, and to exploit successfully the potentials of the Ukraine is a dramatic illustration of the tragic failings of ill-considered and irrational military and political decisions.

TURKISM AND THE SOVIETS. By Charles Warren Hostler. 244 Pages. Frederick A. Praeger, Inc., New York. $7.00.

BY LT COL JAMES R. FRANCIS, *MSC*

The book includes a "Handbook of the Turkish Peoples of the World." It correlates and explains the three great "isms" of the area—Pan-Islamism, Pan-Turkism, and Pan-Turanism—as well as the Pan-Arabic movement.

The history of the tribes that make up the Turkish peoples is traced as is their present distribution.

The author leaves two strong impressions without so stating: one, that the Turkish peoples are a strong ethnic group despite their wide dispersion, and second, that the Turkish peoples outside Turkey (mainly in USSR and Red China) represent a potentially usable internal source of revolution against harsh and unsympathetic masters. Also included are short biographies of some of the leaders of Pan-Turkism.

A worthwhile book which contributes much to an area of scanty knowledge in a most interesting manner, it is recommended for anyone interested in the area, in the historic and current struggle between Russia and Turkey, and in a peoples widely dispersed in a strategic area of the world bound together by many ethnic ties and customs.

JAPAN DICTIONARY. (Japanalia). By Lewis Bush. 226 Pages. The Philosophical Library, Inc., New York. $10.00.

AIR DATES. By Air-Commodore L. G. S. Payne. 565 Pages. Frederick A. Praeger, Inc., New York. $7.50.

BY MAJ CHARLES S. ALLEN, *USAF*

This study is an excellent chronological listing of major events in the world of aviation. The summaries contained under the datelines of important events provide a valuable source of general information on the political, economic, and military events which have influenced the history of aviation. While the emphasis is decidedly British, most major civil and military events in the United States and other nations are covered thoroughly.

Of special interest to the US reader are those chapters devoted to the postwar years. The summaries of the events during this period provide a valuable insight into the growth of western civil and military aviation.

THE TRIAL OF MARSHAL NEY. By Harold Kurtz. 335 Pages. Alfred A. Knopf, Inc., New York. $5.00.

BY LT COL JEAN P. MESLET, *French Army*

Although the title of the book is more restrictive, it actually covers the first two political trials of France's modern history. These are the trials of Charles de la Bédoyère and of Marshal Ney.

The author discusses how the separate, although somewhat linked, destinies of the two men finally grow into one: the firing squad for La Bédoyère in the summer of 1815 and for Ney on 7 December of the same year. Death was faced with equal courage by the two heroes. "You must aim here," said La Bédoyère to the firing squad with a smile, pointing at his heart. "Do you know, *monsieur*," said Ney to the Piedmontese approaching him to blindfold his eyes, "that *un militaire* does not fear death?"

The brilliant and handsome Charles de la Bédoyère was in command of the 7th Regiment sent by the King of France, Louis XVIII, to stop Napoleon's return to France from Elba Island. Instead, with the famous words "Who loves me, follows me," he led his regiment to bring from its hiding place the old eagle standard under which they had fought before. In the evening of 6 March 1815 he rode into Grenoble together with Napoleon.

On the morning of 14 March, eight days later, Marshal Ney read out his incendiary proclamation in which he exhorted the army to pass to the ranks of Napoleon whom he had promised his King to lay at his feet in an iron cage.

A military court composed of four marshals and three generals convened on 9 November 1815. No marshal of France had ever been subject to the judgment of a court-martial. The military court declared itself to be incompetent to judge Marshal Ney accused of high treason. The Chamber of Peers took over the trial which was to end with a death sentence.

It is worth noticing that Marshal Ney was sentenced by a royal court under laws which had been written by the Revolution and Consulate. Also interesting is the political significance of the trial. As stated by Richelieu, Premier of the Cabinet, during the proceedings:

It is in the name of Europe that we have come here to implore and require you to judge Marshal Ney. We dare state that the Chamber of Peers owes the world a signal reparation.

With 10 pages of illustrations, the book is interesting, since, as the author states at the end of the preface: "The trial is well-worth reconstructing for the insight it gives us into problems nearer our own day and age."

TASCHENBUCH DER PANZER 1943-1957. By Dr. F. v. Senger und Etterlin. 389 Pages. J. F. Lehmanns Verlag, München, Germany. $9.50.

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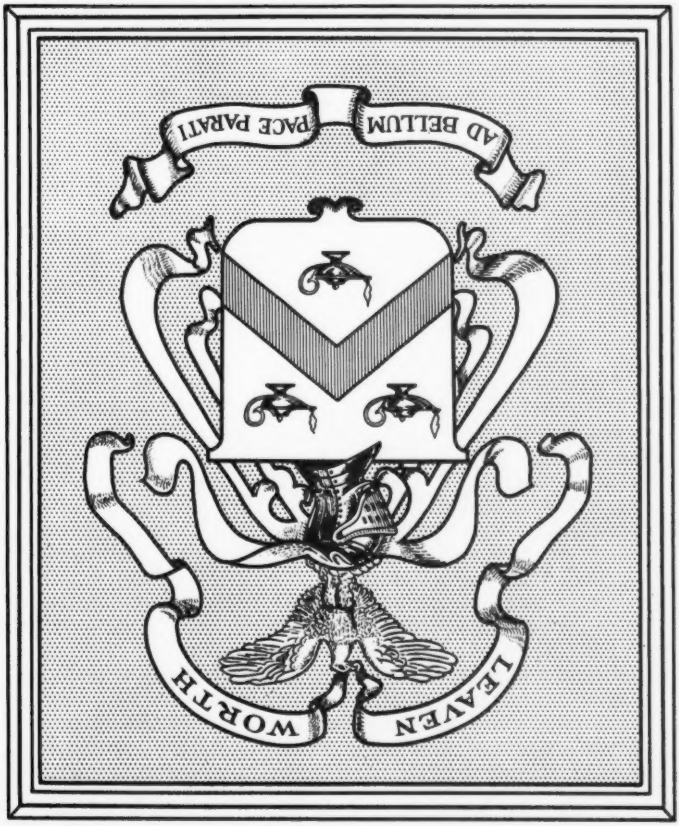
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